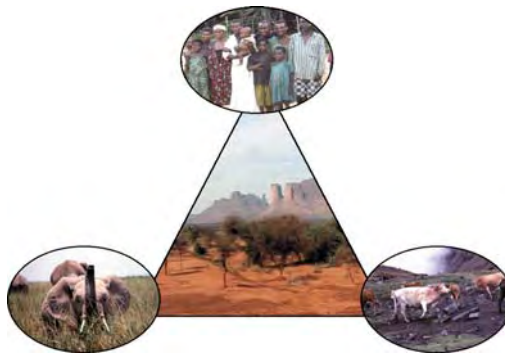


**Final Technical Report from
The Wildlife Conservation Society to the USAID / EGAT / NRM / Global
Conservation Program (GCP) for an Associates Award (September 2005 –
September 2006)**

***Ensuring Health and Development in Landscape Regimes with a
Biodiversity Focus: The Great Limpopo Transfrontier Conservation
Area's Wildlife-Livestock-Human Health Interface***

**Associate Cooperative Agreement
Cooperative Agreement Number: EPP-A-00-05-00005-00
Leader Award Number: LAG-A-00-99-00047-00**



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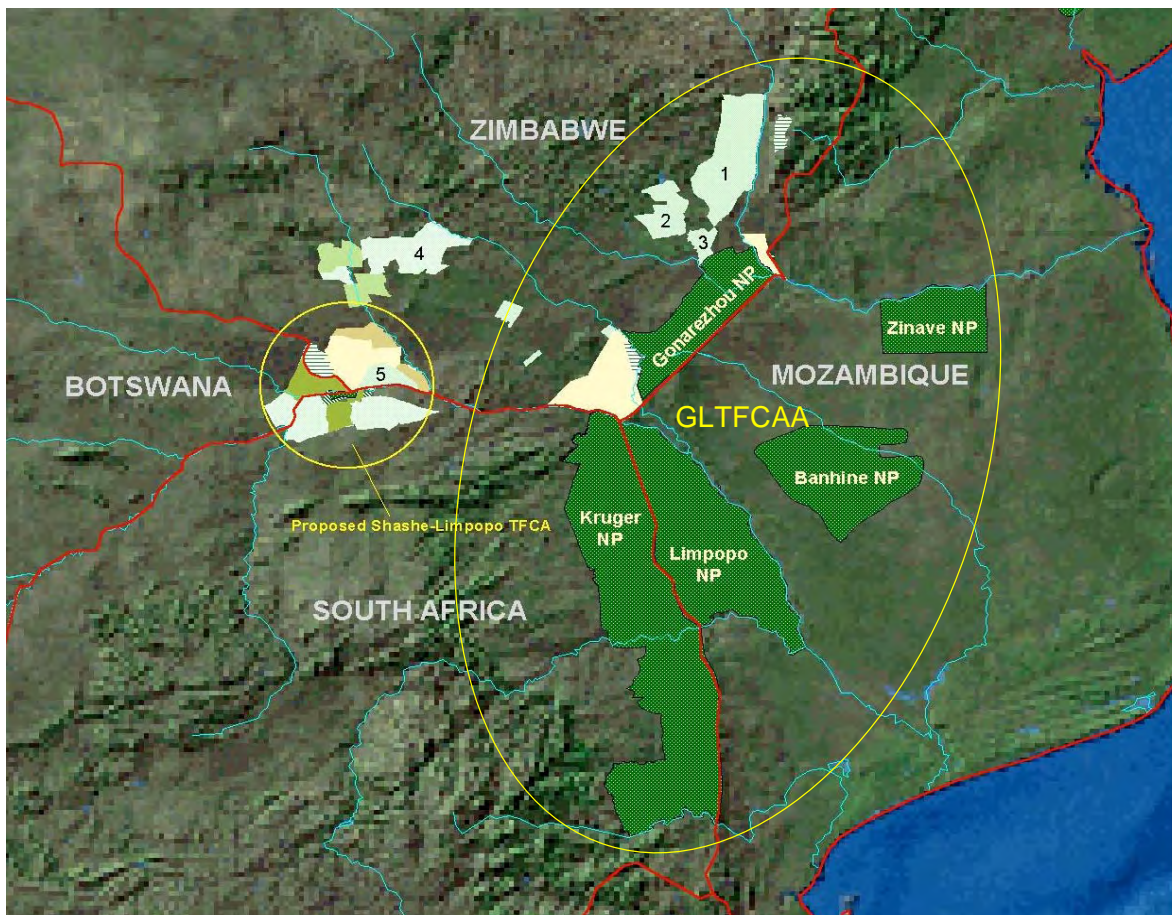


The opinions expressed herein are those of the individual contributors and do not necessarily reflect the views of USAID or the Wildlife Conservation Society.

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Map A. The Great Limpopo Transfrontier Conservation Area (GLTFCA), resulting from a recently internationally agreed land-use plan, brings together South Africa's Kruger National Park; Zimbabwe's Gonarezhou National Park; Mozambique's Limpopo, Banhine and Zinave National Parks, and surrounding lands. The core area involved is 3,577,144 hectares (35,771 km²) with the broader GLTFCA matrix covering approximately 100,000 km².



ABBREVIATIONS AND ACRONYMS

Abbreviation/Acronym	Definition
AHEAD	Animal Health for the Environment And Development
AIDS	acquired immune deficiency syndrome
ASF	African swine fever
AU	African Union
AU/IBAR	African Union/Interafrican Bureau for Animal Resources
BTB	bovine tuberculosis
CASS	Center for Applied Social Sciences
CBNRM	Community-Based Natural Resource Management
CBPP	contagious bovine pleuropneumonia
CCPP	contagious caprine pleuropneumonia
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement
DNAC	National Directorate of the Areas of Conservation
DNAV	National Directorate of the Veterinary Authority
ECF	East Coast fever (theileriasis)
FAO	Food and Agriculture Organization (of the United Nations)
FMD	foot and mouth disease
FVP	Field Veterinary Program (of WCS)
GDP	gross domestic product
GIS	Geographic Information Systems
GLTFCA	Great Limpopo Transfrontier Conservation Area
GLTFP	Great Limpopo Transfrontier Park
GMA	Game Management Area
GR	Game Reserve
ha	hectare
HIV	human immunodeficiency virus
IDRC	International Development Research Centre
INR	Institute of Natural Resources
IUCN	World Conservation Union (International Union for Conservation of Nature and Natural Resources)
JMB	Joint Management Board
KAZA	Kavango Zambezi
KNP	Kruger National Park
LIFE	Living In a Finite Environment
LNP	Limpopo National Park
LoU	Letter of Understanding
MAWRD	Ministry of Agriculture, Water, and Rural Development
MCF	malignant catarrhal fever
MET	Ministry of Environment and Tourism
MoA	Memorandum of Agreement
NGO	nongovernmental organization
NP	National Park
NSF	National Science Foundation

OIE	Office International des Epizooties, <i>also</i> World Organization for Animal Health
PESTEL	Political, Economic, Social-Cultural, Technological, Environmental, Legal factors
RP	rinderpest
RVF	Rift Valley fever
SADC	Southern African Development Community
SANParks	South African National Parks
SASUSG	Southern Africa Sustainable Use Specialist Group
SAT	South African Territories
SEL	South East Lowveld
SELCORE	South East Lowveld Collaborative Research
SELWA	South East Lowveld Wildlife Association
SSC	Species Survival Commission
TB	tuberculosis
TBD	tick-borne disease
TFCA	Transfrontier Conservation Area
TPARI	Transboundary Protected Areas Research Initiative
TREP	Tropical Resource Ecology Programme
US\$	United States dollars
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
WCS	Wildlife Conservation Society
WHS	Wildlife Health Sciences (of WCS)
WG	Working Group
WWF	World Wide Fund for Nature (World Wildlife Fund)

AHEAD Great Limpopo Transfrontier Conservation Area Program



Associate Cooperative Agreement
Cooperative Agreement Number: EPP-A-00-05-00005-00
Leader Award Number: LAG-A-00-99-00047-00

One-Year Highlights (Oct. 1, 2005 – Sept. 30, 2006)

- **One year USAID investment of \$102, 500 leverages over \$748,716 going into the regional *AHEAD* GLTFCA initiative (a multiplier of over 7:1).** This figure includes a grant to CASS (from IDRC) of \$543,716 over 5 years, a grant to INR (from the Sandy County Foundation) of \$20,000 over 1 year, and a WCS contract from the Government of Mozambique (World Bank source) of \$185,000 over 4 years. This figure does NOT include the significant matching and in-kind support provided by *AHEAD* GLTFCA collaborators (governmental and nongovernmental) across South Africa, Mozambique and Zimbabwe.
- **New SADC Regional Biodiversity Strategy**, approved by all SADC member States, specifically highlights the *AHEAD* approach as a model for addressing challenges at the wildlife / livestock / human health interface, particularly in a transboundary context. We are extremely pleased to have been asked to contribute to this milestone policy product, which focuses on biodiversity / development linkages.
- **Key Letters of Understanding** among *AHEAD* GLTFCA collaborating partners have been signed.
- **A Conceptual Framework** for the *AHEAD* GLTFCA initiative is now in place.
- **Scenario Planning** work is proceeding at technical and community levels in the three countries of the GLTFCA.
- **South African National Parks created the first “AHEAD” position within an African national conservation authority.** The “Human Livelihoods, Animal and Ecosystem Health Linkages” (aka ‘AHEAD’) position, created and funded by the Government of South Africa, has been filled by Dr. Nichola (Nicky) Shongwe, who completed her medical degree at the University of Cape Town and has a post-graduate Diploma in Child Health. Dr. Shongwe’s recruitment to this senior policy post may be one of the most critical developments in terms of *AHEAD* to

date. Dr. Shongwe will be responsible for the development of policy and the integration of issues relating to wildlife, livestock, ecosystems goods and services and human livelihoods, with a special focus on Transfrontier Conservation Areas. *The creation and funding of this position by the South African Government* reaffirms that the principles underpinning "One Health" are being adopted as SANParks further develops its transfrontier conservation areas (and 'normal' conservation areas)- that land-use planning and decisions will be made in the context of how the health of wildlife, livestock, people and ecosystems are impacted. In short, it is a tremendous step forward towards a more sustainable approach to wildlife conservation and land stewardship by one of the most science-oriented protected area management authorities on the continent.

- **Two new IUCN books feature *AHEAD* ideas and approaches:**

Conservation and Development Interventions at the Wildlife/Livestock Interface: Implications for Wildlife, Livestock and Human Health by Osofsky *et al.* is currently the #1 rated book on Amazon.com to have come out of a meeting in Durban in 2003 with a focus on the wildlife/livestock/human health interface! (Ha ha.)

Friends for Life: New Partners in Support of Protected Areas features a chapter by Osofsky *et al.* called “Building Support for Protected Areas Using a 'One Health' Perspective.”

- Other countries and regions have sought technical assistance from the *AHEAD* initiative, including **Namibia**. Work in **KAZA** is also looking likely. In addition, USAID has agreed to fund *AHEAD*-related projects in **Zambia** and **Tanzania** through the SANREM and GL CRSPs.
- The multimedia *AHEAD* website, www.wcs-ahead.org, continues to be a hugely important tool for global information-sharing, an ever-more popular resource for unique technical information- all for free in the public domain. During the one year period of USAID support for the *AHEAD* Great Limpopo TFCA initiative (10/1/05– 9/30/06), the *AHEAD* website received **395,000 hits from around the world.**

***AHEAD*-GLTFCA Program – The Year in Review**

1. Introduction

The Animal *Health* for the *Environment* And *Development* (***AHEAD***) initiative was launched at the World Parks Congress held in Durban, South Africa in September 2003. Various groups such as the IUCN Southern Africa Sustainable Use Specialist Group (SASUSG), Veterinary Specialist Group (VSG), African Union-Interafrican Bureau for Animal Resources (AU-IBAR) and others worked with the Wildlife Conservation Society (WCS) to co-organize that initial forum. Much of the material generated at the Durban meeting and since is available at www.wcs-ahead.org, including video of all formal talks and copies of all slide presentations given at the launch. Approx. 80 participants in Durban (veterinarians, ecologists, economists, wildlife managers and other experts from Botswana, Kenya, Malawi, Mozambique, Namibia, South Africa, Tanzania, Uganda, Zambia, Zimbabwe, France, the United States, and the United Kingdom) worked together to delineate landscapes of conservation priority across southern and East Africa with significant disease issues at the wildlife/livestock/human interface. The Great Limpopo Transfrontier Conservation Area (GLTFCA), shared by South Africa, Mozambique, and Zimbabwe, emerged among the group's highest priorities. The hope is that progress can be made in the GLTFCA through international and interdisciplinary collaboration, and that a successful applied research, development, policy, and outreach effort here could also potentially serve as a useful model for other places facing similar challenges in southern and East Africa, and potentially elsewhere. Just the fact that the ***AHEAD*** launch was able to be held at the World Parks Congress was significant. Disease issues have often not had a seat at the conservation table, and the significant sponsorship that was received from agencies such as the US Agency for International Development (**USAID**), US National Science Foundation (**NSF**), the Office International des Epizooties (World Organization for Animal Health or **OIE**) and others at a major event like the IUCN World Parks Congress certainly helped raise awareness about the importance of animal and human health sciences to conservation success.

We wanted to utilize this unique opportunity at the World Parks Congress to address problems facing the regions' largest intact conservation areas, so we tried to focus the forum largely on the growing list of transfrontier conservation areas being developed in East and southern Africa, of which there are 20 or so envisioned to eventually encompass approximately 120 million hectares. These are large landscapes, many of which are grappling with health-related challenges to their success. The GLTFCA really is a fantastic model for addressing the types of challenges these TFCAs face in terms of disease issues and potential impacts on various sectors. There is no formal policy within the Southern African Development Community (SADC), for example, in terms of how to approach disease-related challenges at the livestock/wildlife interface in the context of TFCAs. The ***AHEAD***-GLTFCA program is well placed to provide a model and policy guidelines that could potentially be extended to other areas. And there has already been significant interest in extending the ***AHEAD*** concept within the region. A workshop on the ***AHEAD*** concept was held in Namibia in November 2005, and there is also growing potential for ***AHEAD*** involvement in the Kavango-Zambezi (KAZA) TFCA, which involves Angola, Botswana, Namibia, Zambia and Zimbabwe.

Following the World Parks Congress, the newly conceived ***AHEAD***-GLTFCA Program formed a Working Group which has since held six full Working Group Meetings, two smaller

interim meetings and some specific meetings on priority issues such as the **conceptual framework** and **scenario planning** initiatives, both of which USAID has contributed to, within the program.

2. Development of the GLTFCA and disease issues

The Great Limpopo Transfrontier National *Park* (GLTP) treaty was signed in December, 2002 and includes the Kruger National Park (KNP) in South Africa, the Limpopo National Park (LNP) in Mozambique and the Gonarezhou National Park in Zimbabwe. Note that the Great Limpopo Transfrontier *Conservation Area* is much more extensive than the GLTP. The GLTFCA (Map A), resulting from a recently internationally agreed land-use plan, brings together South Africa's Kruger National Park; Zimbabwe's Gonarezhou National Park; Mozambique's Limpopo, Banhine and Zinave National Parks, and surrounding lands. The core area involved is 3,577,144 hectares (35,771 km²) with the broader GLTFCA matrix covering approximately 100,000 km².

The long term national and regional objectives for the establishment of the Great Limpopo Transfrontier Park are to:

- Foster transfrontier collaboration and cooperation to facilitate biodiversity conservation and effective ecosystem management;
- Promote alliances in the management of natural resources by encouraging socio-economic partnerships (e.g. local communities, private sector, NGOs and governments);
- Enhance ecosystem integrity and processes by harmonizing resource management approaches;
- Facilitate sub-regional economic growth;
- Develop trans-border tourism, and,
- Facilitate the exchange of technical, scientific and legal information.

The formal planning process for the Sengwe-Tshipise Wilderness Corridor in Zimbabwe that will link Gonarezhou and Kruger National Parks has been completed and the corridor should be legally gazetted before the end of the year. The Giriondo Border Post linking Kruger and Limpopo National Parks was formally opened by the three presidents in August 2006. Discussions on a temporary or pontoon crossing on the Limpopo River to allow tourists to travel from Kruger through to Zimbabwe and Gonarezhou are taking place. The Zimbabwe National Army has started clearing mines in the Sengwe-Tshipise Corridor. The official tri-national Joint Management Board (JMB) Conservation and Veterinary sub-committee of the GLTP held a workshop in Skukuza in October 2005 to develop a research policy for the GLTNP and TFCA, and the *AHEAD*-GLTFCA program contributed to those discussions. A research policy has now been drafted.

Animal and human diseases remain a central issue of concern in the full establishment of the GLTP let alone in the establishment of the large transfrontier conservation area. Bovine tuberculosis (BTB) in buffalo has recently reached the northern section of KNP and there is concern that the disease may cross the Limpopo into Zimbabwe via the Sengwe-Tshipise corridor. Surveys in the Sengwe Communal Land have so far not found BTB in the ~2000 cattle examined. In order to link the recently established Limpopo NP to KNP, parts of the eastern boundary fence of KNP have been removed. This has allowed buffalo from KNP to

move into parts of the LNP, mainly along the Limpopo River, that are inhabited by people. One result has been a serious outbreak of theileriasis in cattle.

With increasing elephant populations in KNP, the population has doubled in the last ten year. Fence breakages in the north west of the park have increased, allowing wild ungulates to move into adjacent settled areas. Again, the result has been outbreaks of disease, foot and mouth disease (FMD) in this case, that have been very costly to contain. Towards the end of 2004, there was a serious outbreak of anthrax on the Malilangwe conservancy adjacent to Gonarezhou NP, and further deaths of wild animals occurred during 2005.

Formal designation of the wider GLTFCA has not yet been pursued by the authorities during this year, although some significant new initiatives, in which the *AHEAD*-GLTFCA program has been involved, have moved forward. One major policy development, for example, has been Zimbabwe's acceptance, at least in principle, that the GLTFCA should be extended westwards to link with the Shashe-Limpopo TFCA. And the MOU between Botswana, South Africa and Zimbabwe to form the Shashe Limpopo TFCA was signed in July, 2006.

3. *AHEAD*-GLTFCA Working Group fora, scenario planning meetings, and other interactive efforts in the region

Several *AHEAD*-GLTFCA meetings were convened during the project period (October 2005 through September 2006), the proceedings of which have been fully documented at http://www.wcs-ahead.org/workinggrps_limpopo.html (and are also included in this final technical report) . The first of these was an interim Working Group Meeting on the 19-20th October 2005 that took advantage of a Joint Management Board workshop convened to discuss research policies for the GLTP. *AHEAD*-GLTFCA Coordinator David Cumming attended the two and a half day JMB Workshop and gave a presentation on the *AHEAD*-GLTFCA program and on research in the Zimbabwe component of the GLTFCA. The interim Working Group meeting included a report back on the earlier Framework meeting (held at Skukuza in May 2005), and covered a range of issues related to research developments and systems linkages within the GLTFCA. The meeting included substantial presentations from *AHEAD* partner **TPARI** (Transboundary Protected Areas Research Initiative) on the potential social sciences contribution to efforts in the TFCA, and from the newly established **PPF** (Peace Parks Foundation) Veterinary Program. This material is also available at http://www.wcs-ahead.org/workinggrps_limpopo.html and in this report.

David Cumming and WCS' Michael Kock facilitated a workshop in **Namibia** in November 2005 at the invitation of the Ministry of Environment and Tourism (MET). This workshop served to bring wildlife scientists and managers and colleagues from the agriculture sector together to discuss common issues, and to collaboratively look at approaches to disease control and management within and outside of protected areas in Namibia. The Proceedings of this first *AHEAD* Namibia meeting are available at http://www.wcs-ahead.org/workinggrps_namibia.html and in this report.

A full *AHEAD*-GLTFCA Working Group meeting was held in March 2006 at the Pestana Lodge, in Malelane, South Africa on the southern boundary of Kruger National Park. The venue, midway between Pretoria and Maputo, was selected to facilitate the attendance of participants from Mozambique. The meeting focused on scientific and research issues and was marked by a high level of participation (43 participants) and a series of excellent and

stimulating presentations and discussions. In addition to the Proceeding included in this report, most of the actual presentations are available at http://www.wcs-ahead.org/gltfca_march2006/agenda_march2006.html. A smaller, interim Working Group meeting, to further examine a conceptual framework for the **AHEAD**-GLTFCA program, was convened on the 24th of August, 2006.

This past year saw the **AHEAD**-GLTFCA initiative's first applications of **scenario planning** as a tool to assist in visualizing and preparing for the management of complex systems. Scenario planning has been recognized for some time and is becoming increasingly popular in a wide range of fields. With support from USAID, the Sand County Foundation and WCS, this first phase of scenario planning within the GLTFCA has begun under leadership of Michael Murphree of the University of KwaZulu Natal's Institute of Natural Resources (**INR**). This process will continue at a technical level, and will be complemented by the community-level scenario planning project being led by Centre for Applied Social Sciences (**CASS**) of the University of Zimbabwe, and funded by IDRC (Canada's International Development Research Centre) as discussed below. At this stage, the scenarios approach is still quite experimental. The demand-driven process has now had inception discussions in all three GLTFCA countries:

Zimbabwe: Through the South East Lowveld Collaborative Research (**SELCORE**) program, and related to the proposed establishment of the multi-stakeholder South East Lowveld Wildlife Association (**SELWA**), scenario planning was identified as an important undertaking that would be useful in guiding the development of **SELWA**. This desire was expressed at a recent SELCORE meeting held at Malilangwe (July 2006).

Mozambique: The TFCA program within the National Directorate of the Areas of Conservation (**DNAC**), Ministry of Tourism, has also expressed a keen interest in initiating a scenario planning process within the GLTFCA.

South Africa: The institutional framework in South Africa is provided by South African National Parks (**SANParks**). The first part of a scenario planning exercise was conducted in Skukuza, KNP in August 2006. This process was a valuable learning experience and built logically upon discussions that had occurred in previous **AHEAD**-GLTFCA Working Group meetings. By the end of the process, the group had identified their key questions and the critical system drivers, trying to delineate both the predictable and unpredictable. The next phase will be to develop the scenarios themselves, and this process is ongoing. See ahead for a more detailed scenario planning report from Michael Murphree.

Next stages:

1. In *South Africa* a second session is being planned, possibly for November 2006. In the interim, Michael Murphree will take the current data and set it up for scenario creation.
2. In *Mozambique*, Murphree will work with Drs. Soto and Madope on initiating the process.
3. In *Zimbabwe*, the process will be guided by the establishment of the **SELWA**, and Murphree has agreed to assist in facilitating this scenario planning process.

Please see the chapter of this technical report on the **Scenario Planning** carried out under this award.

As part of the *AHEAD* program's brief to build local institutional capacity, David Cumming reconvened the dormant **SELCORE** Program Committee and organized and facilitated a one and a half day workshop. The workshop, held in the South East Lowveld (SEL), was requested by the National TFCA Conservation and Veterinary Sub-Committee and funded by the Sand County Foundation. The main products from the workshop were guidelines on natural resource and disease monitoring for the TFCA Conservation and Veterinary Sub-Committee, agreement to extend the **SELCORE** program to include an additional three districts and research partners and, importantly, to establish a Lowveld Wildlife Association to build public, private, and community partnerships to improve the management of natural resources in the SEL, and to tackle issues such as veterinary fencing and FMD control zones in a more holistic framework. David Cumming has contributed to several meetings of the Zimbabwe TFCA Conservation and Veterinary Sub-committee during the year, with the result that the *AHEAD*-GLTFCA program is recognized as an important partner in the GLTFCA development process.

4. Additional developments within each country

4.1 Mozambique

Mozambique continues to be a critical partner in the *AHEAD*-GLTFCA initiative. We are very pleased to report that this month (September 2006), a Memorandum of Agreement (MoA) has been finalized among:

- 1) The National Directorate of the Areas of Conservation, (DNAC) Ministry of Tourism, National Government of Mozambique, as represented by its Director, Dr. Bartolomeu Soto,
- 2) The National Directorate of the Veterinary Authority (DNAV) Ministry of Agriculture, National Government of Mozambique, as represented by its Director, Dra. Florência Cipriano,
- 3) The South African National Parks (SANParks), as represented by its Chief Executive Officer, Dr. David Madoda Mabunda; and
- 4) The Wildlife Conservation Society (WCS), as represented by Chief Veterinarian and Vice President for Wildlife Health Sciences, Dr. Robert Cook

This MoA will allow for a range of critical technical work to be undertaken collaboratively in the Mozambican portion of the GLTFCA, with generous support from the World Bank for a range of technical assistance and capacity-building activities needed in order to move the *AHEAD*-GLTFCA initiative forward. The WCS' portion of this leveraged World Bank funding alone is over \$185,000 over 4 years, and could be described as 180 % leveraging of the one year investment USAID has made in the GLTFCA in 2005-2006. (And this percentage is of course not counting the US\$543,716 grant from IDRC (Canada's International Development Research Centre) to the Centre for Applied Social Sciences at the University of Zimbabwe for *AHEAD*-GLTFCA community-level scenarios work, nor the \$20,000 provided by the Sand County Foundation, nor the in-kind matches provided by the regional governmental and NGO partners....!

4.2 South Africa

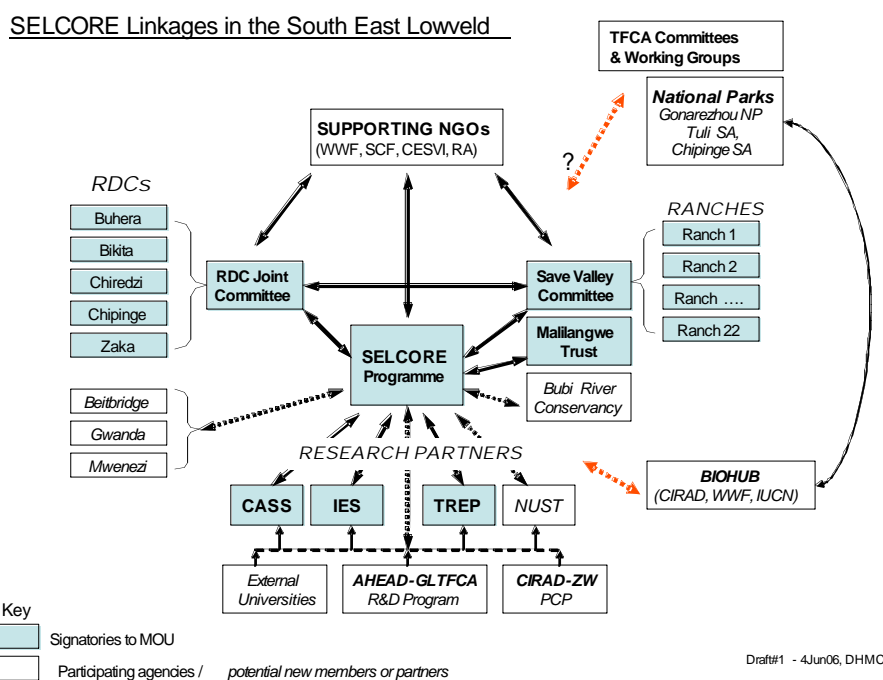
SANParks and the South African Government have embraced the **AHEAD** concept and have appointed a full time coordinator for the program this year. The portfolio to be managed by this new coordinator is called “Human Livelihoods, Animal and Systems Health Linkages in TFCAs.” The successful candidate for the post, Dr. Nichola Shongwe, is a qualified medical practitioner and is based at **SANParks** HQ in Pretoria. A second, research-focused, appointment for the **AHEAD** program is due to be made by **SANParks** soon, and will be based in the Kruger National Park. Full discussions relating to these appointments took place at the 6th **AHEAD**-GLTFCA Working Group Meeting held in Mpumalanga, South Africa.

Several South African organizations have formally agreed, through a Letter of Understanding, to support and participate in the **AHEAD**-GLTFCA program and these are to date: SANParks, Onderstepoort Veterinary Research Institute, Institute of Natural Resource at the University of KwaZulu-Natal and TPARI.

4.3 Zimbabwe

As indicated above, significant institutional developments relating to **SELCORE** and the formation of a Lowveld Wildlife Association were facilitated by the **AHEAD**-GLTFCA program in partnership with the Sand County Foundation during the year. **AHEAD**-GLTFCA Coordinator Dr. David Cumming has actively participated in the national TFCA Sub-committee and started working with the Department of Livestock and Veterinary Services to analyze their historical disease database for the South East Lowveld (SEL).

The following diagram indicates the linkages that are established, or are being established, in relation to the **SELCORE** and **AHEAD** programs.



The following agencies within Zimbabwe have signed the **AHEAD**-GLTFCA Letter of Understanding: Department of Livestock and Veterinary Services, WWF-SARPO, Center for

Applied Social Sciences (CASS) – University of Zimbabwe, Tropical Resource Ecology Program (TREP) – University of Zimbabwe.

As mentioned above, **CASS** received a major grant US\$543,716 from **IDRC** (Canada's International Development Research Centre) to develop scenario planning methodologies and approaches that can be used at village level within the GLTFCA. This project, being implemented by **CASS** and **INR**, is a module within Theme #4 of the **AHEAD-GLTFCA** program. (See “Sustaining animal health and ecosystem services in large landscapes-2nd draft-Concept for a programme to address wildlife, livestock and related human and ecosystem health issues in the Greater Limpopo Trans-frontier Conservation Area,” http://www.wcs-ahead.org/workinggrps_limpopo.html , for a complete description of the initial themes and modules of the program.)

CIRAD (Centre de coopération internationale en recherche agronomique pour le développement) are supporting a PhD study on risk analysis of BTB spread within the Sengwe Communal Land in the SEL. The work is due to be carried out by Dr. Alex Caron, who is registered at the Mammal Research Institute in Pretoria. He has been working closely with the **AHEAD** Program and is member of the Working Group. A survey of livestock practices in the Sengwe area is due to precede his work.

A follow-up survey of herds that revealed potentially positive BTB infection in 2005 was carried out during the year by two Zimbabwean veterinarians supported by **PPF**. The results of the follow-up survey are not yet available. Some 2000 cattle in the Sengwe Communal Land in southeastern Zimbabwe were examined in 2005.

5. Conceptual framework for the *AHEAD-GLTFCA* program

The development of an overarching conceptual framework for the **AHEAD-GLTFCA** program was initiated with a four-day workshop in Skukuza, KNP in May 2005. A summary of the outputs from that meeting was compiled by David Cumming and circulated to a few Working Group members for comment. It was then discussed at the Interim meeting in October 2005, and then was more widely circulated and discussed at the 6th full Working Group Meeting in Mpumalanga (Pestana Lodge) in March 2006. The discussion and feedback from the Pestana meeting resulted in the development of a revised conceptual framework which was presented in outline at a Resilience Alliance Science Meeting in April, and then circulated for critical comment to members of the Working Group. The document was then examined critically at a small Working Group meeting in Skukuza in August 2006 and redrafted by David Cumming (please see the **Framework** chapter in this report). The current draft overarching framework, which places greater emphasis on the sustainable development of the GLTFCA social-ecological system, is now laid out in the form of key overarching questions linking disease, ecosystem goods and services, and socio-economic systems into an interdisciplinary “One Health” paradigm. The framework with the key questions it now poses provide a workable interdisciplinary framework for the **AHEAD-GLTFCA** program.

6. *AHEAD-GLTFCA* Letters of Collaboration

Nine collaborators have thus far signed **AHEAD-GLTFCA** Letters of Understanding, with several more pending. Those letters received have been included in this report. In addition, as

mentioned above, a more detailed Memorandum of Agreement has been developed among the Government of Mozambique, SANParks, and WCS for collaboration in the GLTFCA.

7. Web Site Utilization

The multimedia **AHEAD** website, www.wcs-ahead.org, continues to be a hugely important tool for global information-sharing, an ever-more popular resource for unique technical information- all for free in the public domain. During the one year period of USAID support for the **AHEAD** Great Limpopo TFCA initiative (10/1/06– 9/30/06), the **AHEAD** website received 395,000 hits from around the world.

8. AHEAD Updates

Perhaps one of the best ways to summarize the past year for **AHEAD** in general and for the **AHEAD** Great Limpopo TFCA initiative in particular is to share the milestones enumerated in the two **AHEAD** Updates sent around the world to the growing list of people and institutions participating or interested in the unique cross-sectoral approach to conservation and development that **AHEAD** has come to embody. Below please find the June '06 and September '06 **AHEAD** Updates:

AHEAD Update- June '06

Dear **AHEAD** Colleagues:

*I should again note that if you wish to be removed from this e-mail list please just let me know. My hope is to keep parties interested in **Animal Health for the Environment And Development** up-to-date on developments post-Durban World Parks Congress over time, but I certainly understand if anyone wants to opt out of receiving such messages. Updates are also posted (and archived) on the **AHEAD** website at www.wcs-ahead.org. Please note that URL hotlinks for many of the organizations mentioned below can be found at <http://www.wcs-ahead.org/links.html>.

If you would like to post an item in the next **AHEAD Update**, please just send it to me- thanks!

-SADC releases new Regional Biodiversity Strategy (background information and PDF download site at <http://www.sabsp.org/strategy/index.html>). We are very pleased to see that the **SADC Regional Biodiversity Strategy**, approved by all member States, is now available- and that the **AHEAD** approach is referenced multiple times in the document as a model for addressing challenges at the wildlife / livestock / human health interface, particularly in a transboundary context. We are extremely pleased to have been asked to contribute to this milestone document, which will soon also be available as a downloadable PDF on the **AHEAD** homepage (www.wcs-ahead.org). If you would like me to email it to you in the interim, please just let me know.

This Regional Biodiversity Strategy provides a framework for cooperation on biodiversity issues that transcend national boundaries. It is premised on the fact that the state of the

environment, including biodiversity, is a major determinant of the growth and development of the region and impacts on the lives of its citizens. It is against this background that the Regional Biodiversity Strategy should be viewed as a vehicle for implementing the biodiversity components of our Regional Indicative Strategic Development Plan. The latter embodies the ideals of the New Partnership for Africa's Development [NEPAD] and the Millennium Development Goals [MDGs]. - from the preamble by the President of the Republic of Botswana and Chairperson of SADC, Festus Mogae

-SANParks-based Human Livelihoods, Animal and Ecosystem Health

Linkages position created! South African National Parks (SANParks) has created a new high-level policy position whose key role will be "to assist with the further development and implementation of the *AHEAD* concept and networking forum, amongst other activities." The Pretoria-based post, "Policy Integrator – Human Livelihoods, Animal and Systems Health Linkages in TFCAs" is currently being advertised, in what might be one of the most critical developments in terms of *AHEAD* to date. The person selected for this post will be responsible for the development of policy and the integration of issues relating to wildlife, livestock, ecosystems goods and services and human livelihoods, with a special focus on Transfrontier Conservation Areas. *The creation and funding of this position by the South African Government* reaffirms that the principles underpinning "One Health" are being adopted as SANParks further develops its transfrontier conservation areas (and 'normal' conservation areas)- that land-use planning and decisions will be made in the context of how the health of wildlife, livestock, people and ecosystems are impacted. In short, it is a tremendous step forward towards a more sustainable approach to wildlife conservation and land stewardship by one of the most science-oriented protected area management authorities on the continent. We hope and believe this program will be successful, and will inspire other countries in the region to eventually create similar 'interface' positions with policy responsibilities. A companion research-focused post (Program Coordinator – Veterinary Ecology) is also in the works, with a likely positioning within Kruger. Funding for that position is being sought. For more information on the Policy Integrator post, including a job description, please contact SANParks via Piet Theron <PietT@sanparks.org> .

-Restructuring of Veterinary Services in Mozambique: In April the Minister of Agriculture of Mozambique, Tomás Mandlate, nominated Dr. Florência Massango Cipriano to be the National Director of the Veterinary Authority in Mozambique. Dr. Florência M. Cipriano will be in charge of this new National Directorate with regulatory functions and a vertical chain of command to the Provincial Veterinary Officers . This Directorate is expected to integrate the Animal Health Department and Veterinary Epidemiology Unit of the now defunct National Directorate of Livestock (DINAP). The animal production activities of DINAP will be integrated in the newly established National Directorate of Agrarian Services which includes the former Directorate of Agriculture (crops) (DINA). According to local sources, the changes announced by the Minister open the way for Veterinary Services in Mozambique to adhere to the fundamental organizational and technical principles championed by the OIE and FAO. The Animal Health Department, Provincial Veterinary Officers and many other veterinarians reportedly welcomed this restructuring.

-New book from IUCN's Chief Scientist features *AHEAD* chapter: Osofsky, S. A., Kock, R. A., Kock, M. D., Kalema-Zikusoka, G., Grahn, R., Leyland, T., and W. B. Karesh. 2005. "Building Support for Protected Areas Using a 'One Health' Perspective," pp. 65-79 (plus references), in McNeely, J. A. (ed.) Friends for Life: New Partners in Support of Protected Areas. IUCN, Gland, Switzerland and Cambridge, United Kingdom. **The chapter is now available for free** as a downloadable PDF at <http://www.wcs-ahead.org/print.html> . Or if you'd like it emailed to you, please just let me know.

-Anyone interested can now order the *AHEAD* book (Conservation and Development Interventions at the Wildlife/Livestock Interface: Implications for Wildlife, Livestock and Human Health) not only from **IUCN Publications** but via **Island Press** (www.islandpress.org or 1-800-621-2736) as well as **Amazon.com**- so spread the word! It is currently the #1 rated book on Amazon.com to have come out of a meeting in Durban in 2003 with a focus on the wildlife/livestock/human health interface! (Ha ha.) If you know anyone who wants to write a great review, please send them to Amazon!

-*AHEAD* collaborator Gladys Kalema-Zikusoka of **Conservation Through Public Health (CTPH)** is pleased to report that **CTPH will be receiving two years of USAID support (\$225,000 total)**, in partnership with AWF, for work in Uganda aimed at reducing threats to biodiversity by improving the health of people, wildlife and livestock in and around Bwindi Impenetrable and Queen Elizabeth National Parks. CTPH is using bovine tuberculosis as a disease model for advancing primary and secondary preventative measures in people, wildlife and livestock. In subsequent phases of the project, other diseases of concern to people, wildlife and/or livestock living in and around protected areas may be added, including scabies, anthrax, and HIV/AIDS.

-**USAID Global Livestock Collaborative Research Support Program (CRSP) funds an *AHEAD* collaboration in the Great Ruaha River Watershed of Tanzania:** USAID's Global Livestock CRSP has awarded \$700,000 over the next 2.5 years to support a University of California Davis-WCS-Sokoine University of Agriculture project to investigate disease transmission among wildlife, livestock and people in the Great Ruaha River watershed. This multidisciplinary project is designed to: determine the prevalence and transmission ecology of zoonotic diseases, including bovine tuberculosis, brucellosis and water-borne pathogens in wildlife, livestock, and pastoral and agropastoral communities; assess the affects of river water management and water quality on the presence, abundance, and severity of disease impacts; assess how water management and disease affect the health and economic livelihoods of agropastoral and pastoral communities in the watershed; strengthen the zoonotic disease curriculum and research capacity of the Faculty of Veterinary Medicine at Sokoine University of Agriculture in Morogoro, Tanzania.

-The *AHEAD* website is now hosting a new Working Group: **Namibia**. We welcome Namibia's **MET** (Ministry of Environment and Tourism) and the **SPAN** (Strengthening the Protected Area Network) Project to the *AHEAD* initiative, and are pleased to see the **Proceedings of "Animal Health for the Environment And**

Development: Possible Applications in Namibia? Introductory Workshop (MET), Nov. 2005 " posted at <http://www.wcs-ahead.org/workinggroups.html> .

-The overview report from the May 2005 **AHEAD** GLTFCA "Frameworking" meeting held at Skukuza is now available for downloading in PDF via the **AHEAD** GLTFCA Working Group section of the website (http://www.wcs-ahead.org/workinggrps_limpopo.html): "An Overview of Discussions at the AHEAD-GLTFCA Framework Meeting held at Skukuza, 3rd - 6th May 2005." In addition, one can also now download the PDF of the "Record of the AHEAD-GLTFCA Interim Meeting – October 19–20, 2005, Skukuza, Kruger National Park, South Africa" from the same section of the website.

-The 6th **AHEAD** Great Limpopo TFCA Working Group meeting was held March 9th and 10th, 2006 at the Pestana Kruger Lodge, Mpumalanga, South Africa. The meeting was one of the most dynamic and productive ones yet, as perhaps reflected in the local newspaper, the *Kruger Park Times* (also available at <http://www.krugerparktimes.co.za/krugerpark-times-2-24-transfrontier-policy-21779.html>):

Kruger Park Times

Thinking out of the box to develop transfrontier policy

Forty of southern Africa's top experts got together for two days on March 9 and 10 to discuss scientific discoveries, current projects, and the needs and challenges involved in developing the Great Limpopo Transfrontier Conservation Area. While the experts were drawn from a variety of disciplines, their special focus was on where human activities meet wildlife, and the creation of a healthy environment for humans, livestock and wild animals. They emerged with a sense that they are finally coming to grips with the real, practical, on-the-ground issues that face conservationists as they attempt to merge countries, cultures and wildlife into the current political and conservation ideal of huge international conservation systems.

Sanparks strengthened the positive vibe coming from the meeting when they announced that they hope to host two new [AHEAD-related] positions that will help South Africa, Mozambique and Zimbabwe deal with the variety of hurdles cross-boundary conservation faces. These include understanding the risks associated with the spread of diseases like foot and mouth and bovine tuberculosis in light of the different animal health policies and different economies in the three countries, and how to integrate communal societies and wildlife conservation into a healthy ecosystem.

"Traditional ways cannot deal with issues of large landscapes and transfrontier conservation," said South Africa's Wildlife Conservation Society (WCS) representative Dr Mike Kock, adding that what is needed now is "a cross-section of disciplines discussing complex issues in a complex situation."

This is precisely what has been happening since the 2003 World Parks' Congress, when the concept of Ahead (Animal Health for the Environment And Development) was first put forward. Since then ecologists, veterinarians, social scientists, economists, human health specialists and wildlife managers from a variety of countries have been getting their heads

around the different viewpoints that each discipline brings to the Ahead networking forum. "We're thinking totally out of the box now."

The announcement from Sanparks that they are seeking funding to host two positions that will continue to drive Ahead into the future was wonderful news to Dr Steve Osofsky from WCS New York, who has been helping coordinate the endeavour for the last three years.

"The value of this novel, multidisciplinary approach is affirmed when it is adopted by a leading institution like Sanparks."

Sanparks hope to create the posts of policy integrator/*program* coordinator and a research coordinator who will help keep experts from such a wide variety of fields communicating and developing policies to make the transfrontier park a success on the ground as well as on paper. Carried up to this point by volunteers committed to the concept of a multi-disciplinary task force, the group has now gained so much momentum that it needs full-time leadership.

Ahead's mix of disciplines is fairly unique, and the Ahead Great Limpopo TFCA Working Group will almost certainly become a role model for transfrontier conservation and development around the world.

The **final minutes from the 6th meeting of the AHEAD Great Limpopo TFCA Working Group** are posted in PDF at http://www.wcs-ahead.org/workinggrps_limpopo.html , as are **PDFs of most of the Powerpoint presentations from the agenda** of the 6th **AHEAD** GLTFCA WG meeting (http://www.wcs-ahead.org/gltfca_march2006/agenda_march2006.html).

-Several new **AHEAD** collaborating partners have been added to the LINKs section of the **AHEAD** website at <http://www.wcs-ahead.org/links.html> , including two collaborating organizations in Zimbabwe: **CASS** (Centre for Applied Social Sciences) and **CESVI** [Cooperazione e Sviluppo ("Cooperation and Development")] . From Namibia, there are now links to **MET** (Ministry of Environment and Tourism) and **SPAN** (Strengthening the Protected Area Network). We are also pleased to now have links in place to **TPARI** (Transboundary Protected Areas Research Initiative) and **Sand County Foundation**, very important collaborating organizations. If there are organizations we are inadvertently missing, please just let me know. We of course encourage partner organizations to feel free to link their websites back to www.wcs-ahead.org .

-Funding Opportunity (short deadline)

* International Foundation for Science - research grant opportunities

<http://www.ifs.se/index.asp>

Research grant opportunities from IFS and CODESRIA <http://www.ifs.se/index.asp>

International Foundation for Science

Closing Date: 30 June 2006

Description

Applications for International Foundation for Science (IFS) research grants are welcome from young scientists in developing countries to do research on the sustainable management,

use or conservation
of biological or water resources. This broad statement covers natural science and
social science
research on agriculture, soils, animal production, food science, forestry, agroforestry,
aquatic
resources, natural products, water resources, etc. An IFS Research Grant has a
maximum value of USD 12,000.

Applications are accepted all year and are to be made on an [
http://www.ifs.se/Forms/list_of_all_forms.asp] IFS application form.

Eligibility

Candidate's for an IFS research grant must be:
a citizen of a developing country;
a scientist with at least a Master's or equivalent degree/research
experience;
under 40 years of age and at the beginning of research career; and
attached to a university, national research institution or a
research-oriented non-governmental organisation in a developing country.

Contact details

Email: applications@ifs.se

-Coming in the next *AHEAD* Update- Zimbabwe's **CASS** (Centre for Applied Social Sciences), in collaboration with the University of Natal's **INR** (Institute of Natural Resources), reports on a major funding success related to a proposed five year pilot effort on community-based scenarios planning within the Great Limpopo TFCA.

If you have items for the next ***AHEAD* Update**, please just let me know – thanks.

All the best,

Steve

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AHEAD Update- September '06

Dear *AHEAD* Colleagues:

*I should again note that if you wish to be removed from this e-mail list please just let me know. My hope is to keep parties interested in *Animal Health for the Environment And Development* up-to-date on developments post-Durban World Parks Congress over time, but I certainly understand if anyone wants to opt out of receiving such messages. Updates are also posted (and archived) on the *AHEAD* website at www.wcs-ahead.org . Please note that URL hotlinks for many of the organizations mentioned below can be found at <http://www.wcs-ahead.org/links.html> .

If you would like to post an item in the next *AHEAD Update*, please just send it to me- thanks!

***Happy Birthday *AHEAD* !!!** It was 3 years ago this month that *AHEAD* was launched at the IUCN World Parks Congress in Durban, South Africa. Thanks to all of you who have contributed to the ongoing evolution and growth of *AHEAD* from a pioneering interdisciplinary concept into an exciting cross-sectoral program!

***The Centre for Applied Social Sciences (CASS), University of Zimbabwe is pleased to announce that they have been granted funds by IDRC (Canada's International Development Research Centre) totaling US\$ 543,716 for a five year project entitled "Local level scenario planning, iterative assessment and adaptive management."** The project will be implemented by **CASS** in collaboration with the Institute for Natural Resources (**INR**), University of KwaZulu Natal, in rural communities in Zimbabwe, South Africa and Mozambique living within the Great Limpopo Transfrontier Conservation Area (GLTFCA). The project aims to enhance the collective ability of these communities to devise, implement and adapt their natural resource management regimes so as to maximize the conservation and livelihood benefits they obtain from those resources and their location in the GLTFCA through the use of scenario planning and the resulting social learning, self-assessment and adaptive management. **The project is a module under the *AHEAD GLTFCA Program's Theme #4*: "Human livelihoods, animal and ecosystem health."** The scenario planning project is expected to improve the understanding of GLTFCA planners of the needs and aspirations of resident populations and enhance local influence in overall planning and implementation. The first year of the project will consist of planning modalities, fostering collaboration with other potential partners, and confirming pilot sites in the three countries. Project concept meetings are planned for later in the year, and **CASS** looks forward to the participation of all interested stakeholders. Congratulations to Jeanette Manjengwa, Marshall Murphree, and the **CASS** team on this tremendous success!

***Scenario Planning technical process underway in *AHEAD GLTFCA* program:** The use of scenario planning as a tool to assist in visualizing and preparing for the management of complex systems has been recognized for some time and is becoming increasingly popular in a wide range of fields. With support

from the **Sand County Foundation**, **USAID** and **WCS**, the first phase of scenario planning within the GLTFCA has begun under Mike Murphree's leadership. This process will continue at a technical level under the *AHEAD* umbrella, and will be complemented by the community-level scenario planning project being led by **CASS** (University of Zimbabwe) and funded by **IDRC** (Canada) as summarized above. At this stage, the approach is still quite experimental. The demand-driven process has now had inception discussions in all three GLTFCA countries:

Zimbabwe: Through the **South East Lowveld Collaborative Research (SELCORE) program**, and related to the proposed establishment of the multi-stakeholder **South East Lowveld Wildlife Association (SELWA)**, scenario planning was identified as an important undertaking that would be useful in guiding the development of the Association. This desire was expressed at a recent **SELCORE** meeting held at Malilangwe (July '06).

Mozambique: The TFCFA *program* within the National Directorate of the Areas of Conservation (**DNAC**), Ministry of Tourism, has also expressed a keen interest in initiating a scenario planning process within the GLTFCA.

South Africa: The institutional framework in South Africa is provided by South African National Parks (**SANParks**). The first part of a scenario planning exercise was conducted in Skukuza in August '06. This process was a valuable learning experience and built nicely upon discussions that had occurred in previous *AHEAD* GLTFCA Working Group meetings. By the end of the process, the group had identified their key questions and the critical system drivers, trying to delineate both the predictable and unpredictable. The next phase will be to develop the scenarios themselves, and this process is ongoing.

Next stages:

1. In *South Africa* a second session is being planned, possibly for November '06. In the interim, Mike Murphree will take the current data and set it up for scenario creation. In *Mozambique*, Mike Murphree will work with Drs. Soto and Madope on initiating the formal process. In *Zimbabwe*, the process will be guided by the establishment of the **SELWA**, and Mike Murphree has agreed to assist in facilitating this scenario planning process.

For those that have not been able to participate, would like to participate or would like further information, please feel free to contact Mike Murphree at murphreem@ukzn.ac.za.

*** New collaborative initiative brings *AHEAD* and the WCS GAINS (Global Avian Influenza Network for Surveillance) program together:** The **Percy FitzPatrick Institute of African Ornithology**, in partnership with the **Onderstepoort Veterinary Institute** and **WCS**, is in final discussions about leading implementation of the southern African component of the **USAID**-funded **GAINS** initiative. The goal will be to undertake a regional study of the distributions and movements of ducks and the prevalence of avian influenza viruses in wild duck populations in five sites spread across South Africa (Strandfontein in the Cape, and

Barberspan in Northern Province), Mozambique (still under evaluation; potentially Gorongosa), Botswana (Makgadikgadi Pans and Lake Ngami), and Zimbabwe (Lake Chivero and other lakes near Harare). The primary aims of the project will be twofold: first, to document the prevalence of influenza viruses (i.e., including but not limited to H5 strains) in wild duck populations in southern Africa; and second, to obtain a better understanding of the regional movement patterns of wild water birds. Samples for influenza testing will be collected from ducks at each site. These data will be supplemented by standardized duck counts, measures of water quality and quantity, and a range of other satellite image-derived measures of habitat type and quality. Ducks of two species, red-billed teal and Egyptian geese (which are ducks, despite their common name), will be tracked using GPS telemetry. The results of the study will contribute to a regional and global understanding of the potential role of wild birds in the epidemiology of avian influenzas, as well as shedding light on patterns of duck movements through the year and the causes of nomadism in duck populations in semi-arid areas. **The first year of USAID support for this southern Africa GAINS module is likely to total \$229,000-** with additional support coming from the participating collaborators. For more information on the **Global Avian Influenza Network for Surveillance**, see www.gains.org . For more information on the **Percy FitzPatrick Institute of African Ornithology**, see <http://web.uct.ac.za/depts/fitzpatrick/> .

*The next full **AHEAD Great Limpopo TFCA Working Group** meeting will likely be held in early '07, instead of late '06 due to scheduling challenges. Stay tuned for further information in future **AHEAD** Updates.

***New SANParks Policy Integrator (Human Livelihoods, Animal and Systems Health Linkages in TFCAs) hired!** As per the job search announced in the previous **AHEAD** Update, we are truly excited to announce that SANParks has filled this critical position. Nichola (Nicky) Shongwe completed her medical degree at the University of Cape Town and has a post-graduate Diploma in Child Health. After practicing as a physician full-time for several years, she decided to diversify and explore other areas which included business management and brand management studies, as well as visual arts. Other pursuits have included lecturing on creative development at an advertising school in Johannesburg, and working in television. Nicky now joins **SANParks** with the title **Manager: Conservation and Human Livelihoods**, where she will be working primarily on the **AHEAD** program.

*Several organizations have recently been added to the LINKs section of the **AHEAD** website at <http://www.wcs-ahead.org/links.html> . We are pleased to now have links in place to the **SADC Biodiversity Support Program**, the **UC Davis Wildlife Health Center**, the **Percy FitzPatrick Institute of African Ornithology / University of Cape Town**, **WWF-SARPO**, and the **Rungwa-Ruaha Living Landscapes Conservation Program**- all very important collaborating institutions / programs.

***New Post-Doctoral Fellowships available for 2007-2008: World Wildlife Fund** is announcing the opening of its 2007-2008 Kathryn Fuller Fellowship competition. Two post-doctoral fellowships will be awarded for a two year period to individuals with outstanding research proposals that are of fundamental and immediate importance

to global biodiversity conservation. Fuller Fellows can be based at any institution and will be co-advised by one academic and one WWF mentor. **Fellows are provided a stipend of \$50,000 per year, as well as a \$15,000 annual research allowance.** Applicants should have received a doctorate degree between January 2002 and January 2007. The deadline for applications is November 15, 2006. Offers will be made in the spring of 2007, with fellowships to begin in the fall of 2007. For more information, application guidelines, and on-line application forms, please visit www.worldwildlife.org/sfn, or contact WWF-US at 1-202-778-9742 or [<fuller.fellowship@wwfus.org>](mailto:fuller.fellowship@wwfus.org). The application deadline is November 15, 2006.

***UNDP Small Grants for local NGOs:** UNDP supports a range of projects with civil society organizations (CSOs) and indigenous people's organizations under the category of small grants programs. The Global Environment Facility Small Grants **Program** (SGP/GEF) and the Local Initiative Facility for Urban Environment (LIFE) are examples of such programs aimed at promoting consensus-building and participatory decision-making processes. They are designed and implemented in a decentralized manner. The grant amounts tend to range from \$5,000 to \$100,000 depending on the proposal. Applications are received in rolling basis. For further information about how to apply for this grant, please contact the SGP office in your country or use this contact email: [<marie.khan@undp.org>](mailto:marie.khan@undp.org) Web site: <http://sgp.undp.org/>

***Community Radio Manual available** from Open Society Foundation for South Africa. Published in 1999, the Community Radio Manual is a learning and training text which includes sections on community participation in radio development, a history of community radio, the legal and regulatory environment, development of mission statements and drama production. The manual is written for community radio personnel who speak English as a second language. Available at <http://www.comminit.com/africa/materials/ma2003/materials-1631.html> [Source: Institute for Health and Development Communication, *Soul Beat Africa: Communication for Change*, August 2006]

***Regional TFCAs in the news-**

New Transfrontier Park Key for Regional Eco-Tourism

Mail & Guardian Online- Johannesburg, South Africa- 16 August 2006

The **Great Limpopo Transfrontier National Park**, which links three countries, is a unique opportunity for Southern African eco-tourism and cooperation, said President Thabo Mbeki on Wednesday at the opening of the park's border post. "Today, our wild animals -- the elephants, rhino, antelope and many others -- are once again beginning to roam freely within the Great Limpopo Transfrontier National Park," said Mbeki. "They teach us valuable lessons. And we, the people, now have another possibility to reach out and join hands in partnership, co-operation and interdependence." Mbeki was speaking at the opening of the Giryondo border post at the Great Limpopo Transfrontier Park....

The border post was opened by Mbeki, Mozambican President Armando Guebuza and Zimbabwean President Robert Mugabe. Mbeki called Giryondo "just the beginning of a new era when we will bring down the colonial fences, which divided

our nations over several centuries."

see

http://www.mg.co.za/articlePage.aspx?articleid=280953&area=/breaking_news/breaking_news__national/ for the rest of the story.

New Game Park to Straddle SA, Zim and Botswana

Mail & Guardian Online- Johannesburg, South Africa - 22 June 2006

Richard Davies | Shashe River, Botswana

A pact for a new transfrontier game park straddling the borders between Botswana, South Africa and Zimbabwe was signed on Thursday. The environment ministers of the three countries endorsed the agreement in Botswana on the dry bed of the Shashe River. Once proclaimed, the **Limpopo-Shashe Transfrontier Conservation Area (TFCA)** will cover 4 872 square kilometres, almost a quarter the size of the Kruger National Park.

See

http://www.mg.co.za/articlePage.aspx?articleid=275183&area=/breaking_news/breaking_news__africa/ for the rest of the story.

If you have items for the next **AHEAD Update**, please just let me know – thanks.

All the best,

Steve

Steve Osofsky, DVM

Wildlife Conservation Society- Field Veterinary Program

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The AHEAD-GLTFCA Programme

Key questions and conceptual framework revisited

1. Introduction

The overall objective of the AHEAD-GLTFCA programme¹, as stated in the guiding concept paper², for the programme is as follows:

Facilitate development and conservation success in the GLTFCA through integrated understanding based on innovative inter-disciplinary applied research, monitoring and surveillance at the interface between wild and domestic animal health, ecosystem goods and services, and human livelihoods and wellbeing

The concept paper provided a modular framework within six main **themes**, namely,

1. An overarching conceptual framework to facilitate integrated understanding through interdisciplinary approaches
2. Animal health and disease (6 modules)
3. Land use, ecosystem goods and services, and animal health (5 modules)
4. Human livelihoods, animal and ecosystem health (4 modules)
5. Policy support and capacity building at local, national and regional levels (3 modules)
6. Communications and outreach (6 modules)

Within these themes, apart from the first theme, three to five research modules, including monitoring and surveillance, were defined. They were designed to contribute to improved knowledge and understanding of the linked social-ecological systems that comprise the TFCA and the central role of animal, ecosystem and human health (the concept of “One Health”) in the sustainability of these systems. The working group has deliberated on and developed concepts and specific questions for each of the six themes within the overall programme. The resulting modular structure to the programme facilitates the initiation of particular projects within the overall framework, and some projects have started.

The development of an overarching framework was examined by a small working group meeting (“framework meeting”) held in Skukuza in May 2005. The historical time lines that summarised major shocks and drivers of change in the GLTFCA over the last five hundred years, together with the frameworks and systems models discussed at that meeting, contributed towards the development of an overarching framework required under Theme #1 of the programme. However, the meeting did not get as far as developing a simple and operationally usable framework (see Sections 5 and 6 below for a summary of outputs from the May 2005 Skukuza meeting).

¹ This concept originated at the Southern and East African Experts Panel on Designing Successful Conservation and Development Interventions at the Wildlife/Livestock Interface: Implications for Wildlife, Livestock, and Human Health, *AHEAD* (Animal **H**ealth for the **E**nvironment And **D**evelopment) Forum, IUCN Vth World Parks Congress, Durban, South Africa, September 14th and 15th, 2003.

² Cumming, D. H. M., and WCS *AHEAD* Great Limpopo TFCA Working Group, 2004. “Sustaining animal health and ecosystem services in large landscapes-2nd draft-Concept for a programme to address wildlife, livestock and related human and ecosystem health issues in the Greater Limpopo Trans-frontier Conservation Area.” 24 pp. http://www.wcs-ahead.org/workinggrps_limpopo.html .

The problems of developing such a framework were brought into sharp focus at the 6th full Working Group Meeting¹ held at the Pestana (Mpumalanga, South Africa) in March 2006 following an outline of the frameworks and models that were developed at the May 2005 Skukuza meeting and during some AHEAD-assisted SELCORE workshops in the SE Lowveld of Zimbabwe. The nub of the problem was the absence of an overall research question, or linked set of research questions that might serve to provide a workable, interdisciplinary framework.

Following on from the Pestana meeting a draft framework paper was circulated for comment and discussed by a small working group at Skukuza on the 23rd August, 2006² and has now been revised in the light of those discussions. This document outlines a revised set of research and development questions. The focus of the overarching questions has shifted from an initial central focus on animal disease (i.e. wildlife and domestic animals) to system sustainability and the importance of wildlife/ livestock / human / ecosystem health (the concept of “One Health”) in sustaining large landscapes such as the GLTFCA. There is thus a shift from a central focus on disease to a focus on sustainability with disease remaining a dominant “sub-plot” within the programme – a move that may make for a more coherent interdisciplinary programme. This paper first provides a brief rationale for taking sustainability as a central issue and then develops a set of key questions to provide an interdisciplinary framework for the research and development programme. It then goes on to present the more detailed material that was developed at the earlier May 2005 meeting at Skukuza.

2. Sustainability of the GLTFCA

An initial overarching question is whether the establishment of a large transfrontier conservation area, centered on the recently created Great Limpopo Transfrontier National Park, is a viable and sustainable form of land use for the approximately 100,000 km² involved. Might not other development options be more appropriate or desirable? While the concept of a national park is reasonably well defined, that of a TFCA is not. Many people regard a TFCA as an extension of the protected areas that entails the development of a vast area in which wildlife based tourism is the dominant if not only form of landuse. However, the reality is that the GLTFCA includes within its tentative boundaries land uses that range from fully protected national parks to highly intensive agro-industries based on irrigation. It is best viewed as coupled social-ecological system. A very large proportion of the area is, however, held under communal tenure where the dominant landuse is subsistence agro-pastoralism that is heavily subsidized by off farm income and food aid. A central issue in the establishment and long term sustainability of the GLTFCA is its potential impacts on the livelihoods of the people living in the communal lands and the future development of these areas.

The 2004 concept document offers some guidance on where we might start to re-focus our questions and the overall thrust of the programme, namely, page 4, paragraph 3, reads:

“The evolution of these large TFCAs and coupled social-ecological systems (SES) they incorporate will result in benefits and losses (trade-offs) between their various components. Wild and domestic animal health, the sustainable delivery of ecosystem goods and services,

¹ AHEAD-GLTFCA Working Group reports and other documents are available at http://wcs-ahead.org/workinggrps_limpopo.html

² A revised conceptual framework for the AHEAD-GLTFCA Programme, 8th Aug 2006 draft by David Cumming

and associated human health issues form an important component of this dynamic development.”

The key point here, and perhaps a more suitable focus for the programme, is the set of questions that deal with:

- a. The likely or possible courses of TFCA evolution. What are the alternative scenarios for the development of a semi-arid area of 100,000 km² covering a wide range of landuse and tenure systems?
- b. The various trade-offs that each plausible scenario would entail, namely, (i) the trade-offs between alternative land uses, (ii) the trade-offs between alternative production and livelihood options, (iii) the consequences of alternative development options on biodiversity conservation and ecosystem goods and services, (iv) the consequences of alternative disease management strategies and investment choices for livelihood options, and (v) the risks of alternative development choices or paths to achieving sustainability.

These considerations suggest a shift away from a central focus on disease to a focus on sustainability with disease remaining a dominant “subplot” within it. One of the conceptual diagrams developed in the Skukuza meeting partly captured this (See **Fig. 1**) and the overall programme could be expressed as **“Sustainable futures in the GLTFCA”** or, to place it in a more general framework, as **“Sustainable futures in the marginal dry lands of southern Africa”**. The following paragraph from the March 2004 concept paper lends support to this approach and takes up the suggestion¹ made at the 6th Working Group Meeting in Malelane that the balance between research and development in the programme may need to be reconsidered.

“During the period 1961 to 1994 cereal production *per person* declined by nearly 30% while protein (meat and milk) production declined by more than 50% in southern Africa (Cumming 1999b) resulting in much of the region becoming net importers of food. Livestock populations reached a ceiling in about 1987, by which time the number of humans surpassed the number of livestock units. Meat and milk production per animal and per person for the region is about 1/25th of the production levels in Europe (Cumming 1999b). Given these alarming trends and comparisons, the need to produce greater wealth from marginal lands through alternative enterprises such as high valued wildlife based tourism is clear. Furthermore such service-orientated generation of wealth, which is also partly decoupled from primary production and the vagaries of drought, is likely to generate greater employment opportunities in marginal lands. However, because the tourism sector is also subject to the vagaries of world markets the need to maintain a diversity of production systems (i.e. irrigated agriculture, wildlife and livestock) in arid lands is likely to remain paramount.”

The paramount importance of conserving biodiversity as the cornerstone to sustaining ecosystem goods and services, animal health, and ultimately human health and livelihoods in marginal lands such as the GLTFCA is clear.

In the context of the AHEAD-GLTFCA programme a single overarching question, nested under the overall question of system sustainability, is “How does system health impact on the GLTFCA social-ecological system and vice versa?”

¹ As per Osofsky, in "Minutes for the Sixth Meeting of the AHEAD-GLTFCA Working Group – March 9–10, 2006, Pestana Kruger Lodge, Mpumalanga, South Africa," pp. 2-3. http://www.wcs-ahead.org/workinggrps_limpopo.html

However, rather than aim to develop a single overarching conceptual model or framework, better progress may be made by looking at a range of linked conceptual models within a common vision such as long term sustainability and resilience. The following section reconsiders each of the main research and development themes, namely, Theme #2 – “Animal health and disease,” Theme #3 – “Landuse, ecosystem goods and services and animal health,” and Theme #4 – “Human livelihoods, ecosystem goods and services and animal health” in terms of key questions within each theme.

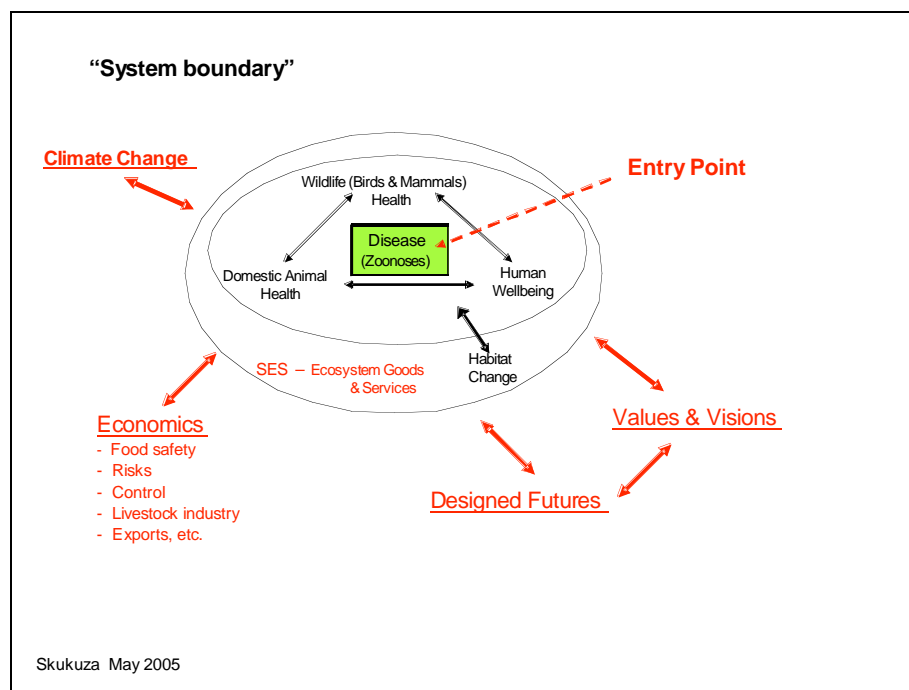


Figure 1. An outline of the system boundary for the AHEAD-GLTFCA programme developed at the May 2005 Skukuza meeting.

3. Key thematic questions

Theme #2 Animal health and disease

The theme has three modules: epidemiology, alternative management strategies and theoretical studies. It does not have a central theoretical or conceptual focus and is very much a collection of projects and concepts, centered on currently important diseases with a bias towards standard veterinary science approaches to the various problems, i.e. apart from the concepts so far advanced under the theoretical module. A key issue in this module is that very basic information on the incidence and spatial and temporal patterns of diseases in wildlife, domestic animals and humans is not known – apart perhaps for one or two diseases and then for only parts of the GLTFCA. So the first and most basic question that needs to be answered are:

1. *What are the levels (incidence) and spatial and temporal patterns of diseases in wildlife, livestock and humans in the GLTFCA?*
2. *How are these patterns related to landuse or land tenure, or both – and to human livelihoods?"*

Answering these questions is not a trivial undertaking in itself, but the answers are a necessary first step to developing a coherent set of more cogent questions and a research programme with predictive models on the role of disease and animal and human health in the development and sustainability of the TFCA. Up to now we have assumed that the disease issue is of central importance but we need to challenge that assumption with sound data by carrying out the necessary baseline surveys, analyses and modelling.

Theme #3 – Landuse, ecosystem goods and services, and animal health

The modules and projects so far considered under this theme would require very detailed information on the spatial and temporal distribution of diseases in the GLTFCA. The underlying disease dynamics would need to be well known in order to explore many of the issues that fall under this theme. That information is not in place. Neither is there detailed information on the distribution of ecosystem goods and services within the GLTFCA. Are there alternative, readily measurable, proxies that can be used for examining questions about the links between landuse, ecosystem goods and services and animal and human health? The normalized deviation vegetation index (NDVI) may serve as an initial proxy for primary production and the status of ecosystem goods and services, and provide the basis for two initial primary questions that could be answered more readily, namely,

1. *What is the distribution of primary production, as reflected by NDVI (a proxy for ecosystem goods and services), in the GLTFCA?*
2. *How does NDVI vary seasonally and annually in relation to soils, topography, landuse and land tenure?*

Once patterns of primary production in relation to landuse and tenure have been explored using remote sensing, the next step would be to conduct stratified ground surveys to determine livestock numbers and their condition and disease status. Thereafter more specific questions about the links between landuse, ecosystem goods and services, and wildlife and domestic animal health could be explored.

Theme #4 – Human livelihoods, animal health and ecosystem health

The modules under this theme deal with scenario planning, trade-offs between alternative landuses, implications of alternative policies and institutions, and baseline indicators. While funding for initial phases of scenario planning has been obtained, further thought needs to be given to the potential for synergistic linkages between major landuse options and how they may contribute to sustainability and resilience. An evaluation of trade-offs between alternative land uses will need to examine economic, social and environmental costs and benefits. The broad question linking the modules under this theme and providing a link to the two previous questions can be framed as

1. *What are the plausible alternative livelihoods (futures/scenarios) for the GLTFCA and the various components within it?*
2. *What are the associated social, economic, and environmental costs and benefits of current and alternative futures?*

This problem will need to be tackled in a fully participatory manner using at least three scales, namely, local or farm community/village level, the sub-regional level (i.e. within each country), and at the regional, i.e. entire GLTFCA, level.

4. A conceptual framework and key questions

Answers to the main questions posed above would provide the basis for exploring the linkages between animal, human and ecosystem health and feed directly into the important issues of social and cultural values and resource management choices (i.e. policy) and thus into a modified Theme #5 of the initial March 2004 concept document. Social and cultural choices then lead to management and feedbacks to the continuing exploration of questions about ecosystem productivity and sustainability, cost and benefits to all stakeholders (including the environment and biodiversity) and issues of animal and human health and well being. Further consideration of these issues leads to five important supplementary questions that link the GLTFCA to the wider context of national and international linkages and that need to be explored.

These ideas are summarized diagrammatically in **Figures 2-3** below.

A key feature of this framework is that it focuses on questions that have to be tackled before the programme can move into more advanced and specific research areas, i.e. the initial characterisation of the system is required as the basis for developing more advanced research questions and informing development policy. The key ecological question concerning productivity, ecosystem goods and services, and land tenure can be tackled rapidly and at relatively low cost. It will also serve to more firmly establish the links between research and development.

Information and analyses resulting from answers to the key questions posed above, and summarized in **Figures 2 and 3**, lead on to questions about sustainability and resilience of the social-ecological system that might be encompassed by the GLTFCA. If the longer term objective is to develop a sustainable, healthy, and **resilient social-ecological system**, then we might add to, or reframe, some of the key questions along the following lines:

1. What types and pattern of land tenure will enhance system health [‘system health’ referring to wild and domestic animal and human health and livelihoods (the “disease” component of the AHEAD-GLTFCA program) as well as to ecosystem goods and services], productivity and resilience (sustainability) of the social-ecological system (SES) of the GLTFCA?
2. What is the state and trend of the five capitals (natural, human, social, financial, and physical) in each landuse/land tenure component of the GLTFCA and how might these change and influence system health under differing scenarios?
3. How will the biodiversity, environmental, social and economic trade-offs/opportunity costs of alternative patterns of land use influence adaptability and resilience of the SES?
4. What cross-subsidies exist within the system and how vulnerable are they to disturbance or shocks?
5. What is the level of external subsidy to the GLTFCA system and how dependent is the system on, or vulnerable to, external subsidies? (How do external subsidies support or hinder the development of adaptability, transformability and resilience of the SES?)

These are important questions and even partial answers to them would further strengthen the links between research and development, and contribute to sustainable development of the GLTFCA social–ecological system.

An important component of a systemic study of the GLTFCA is that of tracing some of the shocks and drivers of change that have influenced the past development of the region and this is explored in the next section.

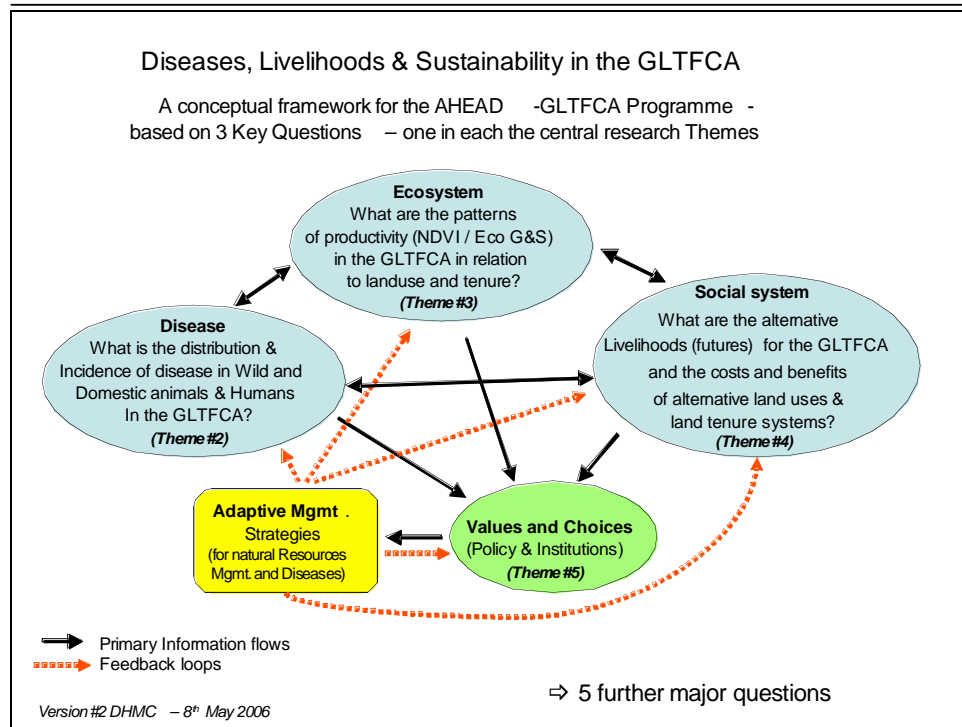


Figure 2. A revised conceptual outline for the AHEAD-GLTFCA program, based on three initial key questions that link to policy and adaptive management strategies, which provides a basis for feedback to ongoing research, learning and development.

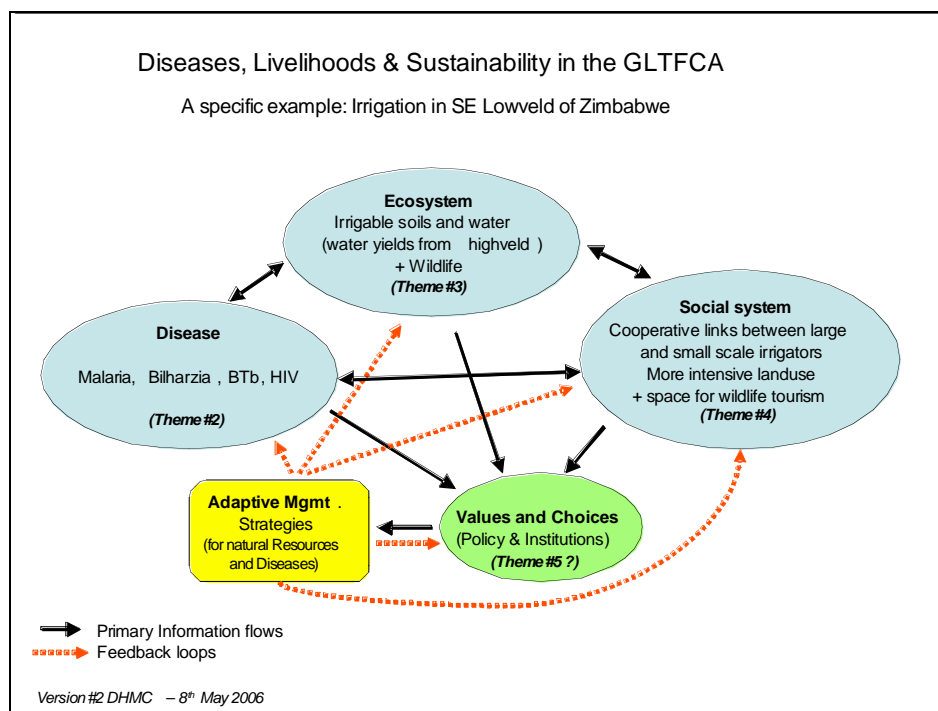


Figure 3. A specific example of the application of the broader questions to a particular sector or component within the GLTFCA

5. Historical time lines and drivers of change

Past shocks to the GLTFCA region provide valuable background information on the drivers that have shaped the history and development of the social-ecological system of the region. These varied from large scale changes that occurred across southern Africa, to changes at national levels, to those that may have been localized within all or part of the GLTFCA. A larger number and range of these changes, influences and shocks were captured during an examination of time lines at the Skukuza workshop in May 2005 (see Appendix 1).

The first major change occurred about 2000 years ago with the Bantu migration into southern Africa which was soon followed by the introduction of domestic livestock. Archaeological research indicates that livestock had become an important component of human economies in the GLTFCA region by about 700AD and they have continued to be so since then. The period 1500 to 1800 was characterized by the climatic impacts of the mini-ice age, serious droughts, devastating wars and the collapse of dynasties such as that of Great Zimbabwe. This period also saw the start of European colonization along the coast and associated trade particularly in gold and ivory and some alien diseases. The following century, 1800 – 1900 witnessed an acceleration of colonial influence, but little if any settlement, within the GLTFCA area. Nevertheless this was a period during which serious alien human and livestock diseases (e.g. measles, East Coast Fever and rinderpest) were introduced to the region. Elephant populations were all but eliminated from the region by 1870 and wildlife and livestock populations were decimated during the 1890s by rinderpest.

With accelerating development under colonial governments the period 1900 to 1945 was dominated by land tenure and land apportionment policies that entrenched the dual agricultural systems of small

scale communal tenure and largely subsistence agriculture on the one hand and large scale commercial agriculture on the other hand. Associated with land apportionment policies was the setting aside of large game reserves from which people were relocated in South Africa and Zimbabwe but not in Mozambique. These areas later became established National Parks (KNP in 1902, Gonarezhou NP in 1938, and Limpopo National Park in 2001: note that the initial areas and boundaries of both KNP and GNP were extended in later years). The introduction of new technologies in human and animal health care resulted in rapid growth of both human and livestock populations. The introduction of market economies, which overwhelmed local barter economies, effectively forced rural people into the formal labour market to meet taxes and other necessities. Human and animal diseases [e.g. malaria, anthrax, trypanosomiasis, theileriasis, foot and mouth disease (FMD)] continued to have a significant impact on local economies in the GLTFCA region.

The end of the Second World War in 1945 was followed by a second wave of colonization, further relocation of local people and the development of large scale commercial agriculture and irrigation in the region. The devolution of custodianship of wildlife to owners or occupiers of commercial farm land resulted in a rapid increase in wildlife ranching followed by the development of lucrative wildlife-based tourism enterprises on large commercial ranches and conservancies. Rural human and livestock populations continued to increase. Civil and liberation wars in Mozambique and Zimbabwe impacted the region during the 1970s and 1980s. Changing global markets and prices of oil and increasing constraints on marketing of livestock from the region impacted local economies. The growing green movement and animal rights movements have more recently started to have major influences on wildlife management policies and sustainable use options relating to wildlife and particularly for the management of elephant populations.

As in previous periods, major droughts and floods and human and animal diseases continued to play a significant role in the development of the region. By the 1960s tsetse flies, and trypanosomiasis, had advanced well south and west of the Save River and joint international control operations during the late 1960s and early 1970s were required to halt their advance and drive the fly back to the area north of the Save River in Mozambique. FMD continued to impact the livestock industry, with control measures having major secondary impacts on the wildlife industry in south eastern Zimbabwe and more recently in north eastern South Africa adjacent to KNP. The advent of HIV-AIDS and the spread of bovine tuberculosis pose more recent threats to human wellbeing, and development of the region. The increasing human / wildlife / domestic animal contact increase the risks of the emergence / resurgence of diseases, including zoonoses.

In summary the major shocks and drivers of change within the GLTFCA region have been as follows:

- a) Wars and dislocation of people, including colonial occupation
- b) Periodic severe droughts and floods
- c) Introduced diseases and zoonoses arising from increasing contact at the interface between wildlife, livestock and humans
- d) Population growth of humans and livestock
- e) Central government policies and legislation, particularly in relation to land apportionment and tenure, and in relation to the devolution of custodianship of wildlife.
- f) The introduction of market economies in about 1900.
- g) Global economic drivers such as pricing of fuel and other commodities.

h) The green and animal welfare movements

A preliminary, but nevertheless comprehensive systems model of a communal land agro-pastoral system was developed (**Fig. 4**) and formed the basis of several conceptual diagrams that depicted linkages within and between the main themes of the programme. A simplification of this diagram that focuses on the zoonotic pool and disease control strategies is shown in **Fig. 5**.

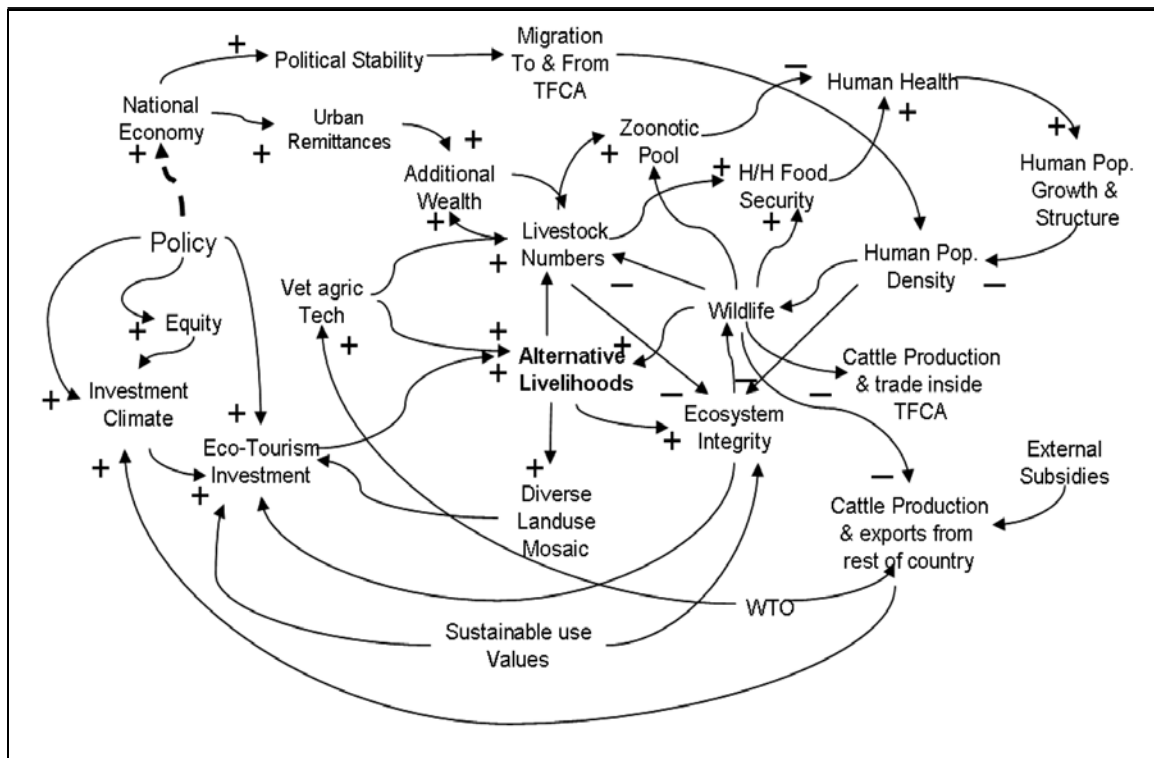


Figure 4. Systems diagram of major influences affecting alternative livelihoods in a communal agro-pastoral system in the GLTFCA (Mozambique and Zimbabwe)

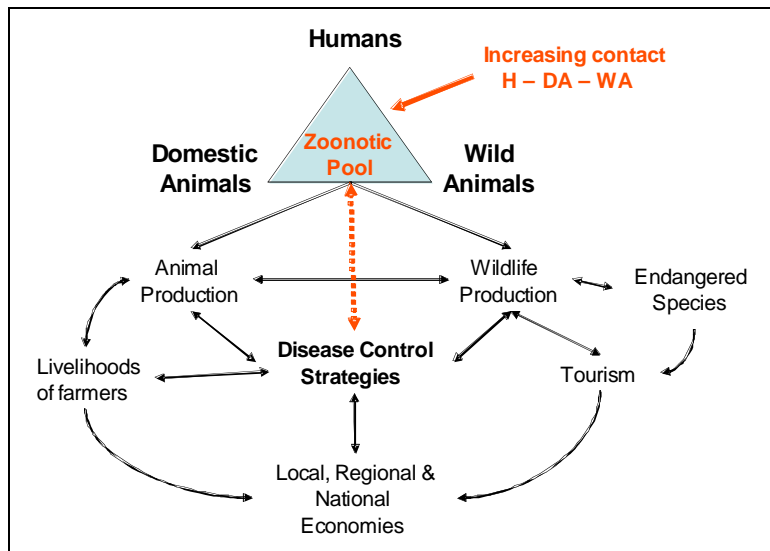


Figure. 5 Conceptual diagram of the linkages between wildlife, livestock and human diseases and the potential implications of disease control strategies for livelihoods and conservation.

6. Concluding comment

The current draft overarching framework, which places greater emphasis on the sustainable development of the GLTFCA social-ecological system, is now framed in the form of key overarching questions linking disease, ecosystem goods and service and socio-economic systems into an interdisciplinary “One Health” paradigm. The framework and key questions posed here now provide a workable interdisciplinary framework for the AHEAD-GLTFCA programme. The research questions provide a clear basis on which to initiate an interdisciplinary programme clearly linked to exploring issues affecting long term sustainability of the GLTFCA system and the role of diseases in system dynamics.

Appendix - Historical time lines and drivers in the GLTFCA system.

Time Period	South Africa	Regional and Mozambique	Zimbabwe	Key Drivers/Changes
Pre 1500		Livestock invasions		- New wildlife-livestock disease interactions and evolution Period of wealth accumulation
1500 to 1800	European settlement started in 1725 Mfecane Wars	← Mini Ice Age – Arid period? → - Establishment of Portuguese ports on the coast – Delagoa Bay ← Firearms and ivory trade →	Collapse of Great Zimbabwe	Turmoil and collapse of dynasties
1800 to 1900 (What did the landscape look like? Very open?)	1836 Cape Settlers move north Anglo-Boer War Sabi Game Reserve 1898 Gold rush – Barberton and Pilgram's Rest	← Introduction of alien diseases → after about 1830 (Bovine TB, Brucellosis and Human TB) ← 1884 Conference of Berlin → and partition of Africa ← Ivory trade collapsed 1890 → ← Rinderpest → collapse of livestock populations	1835 Measles and smallpox outbreaks 1893-96 Matebele wars	- Movements of people & War - Introduced human diseases and population declines - Colonisation - Collapse of Wildlife & Livestock populations - “Kings Game” legislation
1900 to 1945 Conservationist paradigm (Focus on erosion, grazing and livestock management)	1908 – OVRI 1912 ANC formed 1913 Native land Act European settlement in Lowveld from 1910 1936 Natives Trust Land Act (Acornhoek) 1940s irrigation and agricultural development	???? (major gap in info here for Mozambique) ← Shangaans to the Mines → ← Rapid Demographic changes → (linked to malaria control) ← 1st World War 1914-1918 → ← Anthrax panzootic 1923 → ← 1929 – 30 Great Depression → ← Asian Flu (c. 1920?) →	Pole tax and labour laws 1911 Land apportionment 1915 European settlement 1923 Self governing colony 1928 Gonarezhou GR 1929? Tsetse expansion into SEL and start of control hunting 1931 FMD in Zim	- Start of vet research, dips, vaccines and wildlife control to control livestock diseases - Rapid human pop. Growth - Land resettlement and displacements - Expansion of livestock pop. - Artificial water supplies for wildlife - Bush encroachment + Trees - Game reserves and recovery of wildlife from hunting and rinderpest - Fencing & Mechanisation - Anthrax Panzootic in lowveld

Appendix (Continued) Historical time lines and drivers in the GLTFCA system.

Time Period	South Africa	Regional and Mozambique	Zimbabwe	Key Drivers/Changes
1945 – 2005 <ul style="list-style-type: none"> • Changing paradigms from “Game Reserves” in early days to “Ecosystem Stability” and pragmatic intervention to maintain stability, to “Biodiversity / Heterogeneity” • 1960s Wildlife vets with capture & translocation • ? of thresholds in control and outbreaks of animal diseases • CITES and green activist movement • Environmental Justice 	<ul style="list-style-type: none"> • 1959 Bantu Self Govt. Act • Expansion of irrigation • Shift to wildlife landuse from 1952 but mainly since 1970s with rapid development since 1975 - rise in land prices • Extension of Kruger NP in 1960s • Culling of elephant 1967 and buffalo and hippos • Progressive decline of livestock (FMD & marketing) • 1980s Crisis in Agric. With reduced subsidies and further shift to wildlife in lowveld • Anthrax epizootics in 1990, 91, 93, 99. • EMC in elephants in 1993 • Bovine TB in wildlife 1960s but only diagnosed in 1990 • Elephant culling moratorium 1995 • Democratisation in SA followed by new Biodiversity, water and land legislation with cooperative governance of natural resources • Land claims • Increasing tourism since 1994 • Translocations and fences dropped → 	<p>← Atlantic Charter Decolonisation →</p> <p>← Eradication of Tsetse → (East Coast fever, BCPP, Glanders)</p> <p>← Trade driven disease control → (1970s with fences to control wildlife, mainly buffalo, & people?)</p> <ul style="list-style-type: none"> • 1972 Bahnine and Zinave gazetted • Fall of Salazaar Govt. and decolonization • Civil War and collapse of wildlife management <p>← GATT/WTO/OIE impacts → (since 1980)</p> <p>← Major drought 1991/92 →</p> <p>← Major Floods 2001/02 →</p> <p>← TFCAs 2002 →</p> <p>← Emerging infections →</p> <p>← Water catchment Mgmt. →</p> <p>← Regional Climate Change →</p>	<ul style="list-style-type: none"> • Second wave of European immigration 1945-55 • Contraction of area of Communal Lands in SEL • Major irrigation schemes developed 1950s & 1960s • 1960 Beginning of Game Ranching • Role of buffalo in FMD established • Eradication of buffalo in SE • Elephant culls 1970s and translocations 1990s • Liberation War 1975-80 • 1989 CITES ban on ivory trade and cessation of culling • Start of CAMPFIRE • Conservancies 1991/92 • Tourism declines 1997 • 2000 land reform and economic decline and crash in tourism 	<ul style="list-style-type: none"> • Human Population Growth • Land tenure and relocation of people • Wildlife legislation and ownership to farmers in 1960s and 1970s • Increase in knowledge of diseases with developments in molecular biology • Increased tourism (1950s) and increased water points, roads, etc. • Liberation wars/Civil wars • Droughts and impact of El Nino • Political instability triggering disease outbreaks • World Trade dynamics • Increasing contact between people and wildlife • Habitat changes • Translocation of animals • Diseases crossing species barriers (e.g. BTB) • Increased water demand with population growth and agro-industries • Changes in legislation • Politics of Patronage • Exchange rates and tourism growth • Fuel prices and airfares

Scenario Planning Inception, AHEAD GLTFCA Initiative

Update Report

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September 2006

Introduction

Scenario planning has been around for some time (since WWII) and its use by the military (Herman Khan) and by big business (Shell Global Scenarios) is well documented. However, its use as a management and planning tool in natural resource management has only recently started to develop. The decision to use scenario planning in the GLTFCA is directly as a result of the AHEAD programme and a meeting in Pretoria where it became clear that there were so many issues and driving forces in the GLTFCA that “we” needed some way to analyse these issues and driving forces and the role they might play in the future. The concept of scenario planning was introduced and it was agreed to take this approach. It has also been accepted right from the outset that the scenario planning process to be used in the GLTFCA would be experimental and adaptive to local needs and conditions.

One of the challenges in the GLTFCA is scale, and scenario planning is scale sensitive. This is clearly demonstrated by the sign below:



The sign represents a single scenario – quite common in the GLTFCA (large animals crossing the road). However, the implications of the scenario are very different depending on your transport status. This will of course also become more acutely evident in your reaction should the scenario evolve!

This aspect is clearly understood by the AHEAD partners and this report is the first part of an ambitious programme of scenario planning at a wide range of levels and involving a wide range of stakeholders throughout the GLTFCA.

The author would like to stress that this process is not complete, and some of the extrapolations described in this document have yet to be validated by the participants. The material presented in this first report is therefore to be taken as primarily illustrative of the methodological avenues this scenarios process is exploring.

1. Process

The scenario planning process undertaken under the AHEAD GLTFCA initiative has to date involved the following:

- Consultation and briefing of AHEAD members on scenario planning.
- Identification of AHEAD members wishing to participate in the scenario planning process.
- Identification of key partners and institutions in participating countries to facilitate and provide a focal point for presenting a scenario planning option to local stakeholders.
- Background research and development of the “fast track” scenario planning process.
- Decision not to attempt joint tri-national meeting at this stage but to allow the process to evolve in each country with a joint meeting to be held at some point in the future (see lessons learned).
- Meetings with institutional partners and stakeholders in Zimbabwe and Mozambique.
- Organisation and implementation of an initial scenario planning workshop in South Africa.
- Report back to AHEAD members.
- Discussion with Mozambican partners on initial scenario planning meeting.
- Discussion with Centre for Applied Social Sciences at the University of Zimbabwe (UZ) on a community-level scenario planning project.
- Discussions with **South East Lowveld Collaborative Research (SELCORE)** programme stakeholders in Zimbabwe on using scenario planning during the formulation of the South East Lowveld Wildlife Association.

2. Results

a. Zimbabwe

The process in Zimbabwe has involved discussion with Zimbabweans involved in AHEAD and meeting with other stakeholders at the SELCOR meeting held in Zimbabwe. Activities in Zimbabwe remain constrained by the ongoing political and economic crisis that impacts on stakeholders at all levels. On an economic level the reluctance of donors to engage with Zimbabwe until political reforms are implemented has meant that there is very little money available to fund these types of activities. This problem is exacerbated by an overall economic collapse that has resulted in a decline in tourism, agriculture and other forms of local income generation. Zimbabweans are so concerned with meeting their own livelihood needs and coping with the highest inflation rate in the world that they find little time to think of other activities. Within this context it was pleasantly surprising to find the Zimbabweans keen to use scenario planning as a tool for stimulating economic activity in the SE Lowveld – and to use AHEAD as the vehicle for this process. In addition to this, a US\$543,716 grant from IDRC (Canada's International Development Research Centre) to the Centre for Applied Social Sciences at the University of Zimbabwe has been given for the specific purpose of developing scenario planning and adaptive management at a village level in the GLTFCA. The grant is specifically linked to AHEAD and requires the integration with the other AHEAD modules. It is also co-implemented by another AHEAD partner – the Institute of Natural Resources (INR) of the University of KwaZulu Natal, responsible for community-level scenarios work in South Africa and Mozambique, along with providing guidance on scenario planning techniques to other partners and stakeholders. In addition to this, another \$5,000 has been allocated by the Bio Hub initiative to use scenario planning in resolving a settlement dispute in Gonarezhou National Park – this issue has direct relevance to the issues being addressed by AHEAD. Finally, the Sand County Foundation has contributed \$20,000 to the AHEAD GLTFCA scenario planning process.



Fig 1. SELCORE Meeting – Malilangwe, Zimbabwe

- Consultations and discussions with Zimbabwean members of AHEAD – initial assessment of the enthusiasm in Zimbabwe to undertake planning processes.
- Attendance at SELCORE meeting and presentation and discussion on the use of scenario planning as a planning and management tool. Interest expressed by a range of stakeholders on the use of scenario planning, especially among the rural district councils. Meeting resolves to develop a South East Lowveld Wildlife Association and to undertake as one of its first activities a scenario planning process as a link to the AHEAD network.
- Main issues arising in the SELCORE meetings and discussions with Zimbabwean stakeholders are related to land use management options in light of a new veterinary cordon fence to be erected to control foot and mouth disease in the SEL. Other land management issues include the land tenure status on private commercial land and the settlement in Gonarezhou National Park by the Chitsa community.
- CASS/INR meet to discuss the IDRC grant and its linkages to AHEAD and Sand County Foundation Grants. The work plan for 2006/2007 is developed. This work plan includes meeting with other AHEAD partners.

b. Mozambique

Mozambique has trailed behind Zimbabwe and South Africa in the scenario planning process primarily because the principal AHEAD partners in the National Directorate of Conservation Areas (DNAC) have been occupied with the launch of a multi-million dollar World Bank-funded TFCA project. This project has taken considerable local human resources and has made accessing Mozambican staff especially difficult. However, a briefing meeting was held in Maputo during which it was agreed that a scenario planning process would be undertaken in early 2007.

c. South Africa

South Africa has moved further with the scenario planning process than the other AHEAD partner countries. An initial scenario planning meeting was held in Kruger National Park in August 2006. This meeting also was the first experiment with “fast track” scenario planning and several lessons were learned in this exercise.

A subsequent meeting will be held in November in Kruger using the counterpart scenario funding allocation from the Sand County Foundation.

The Kruger Scenario Planning Process

The scenario planning process used in Kruger will be essentially a similar process in technique that will be used in Zimbabwe and Mozambique. This technique requires the participants to develop the scenarios rather than the facilitator. The

process works best with groups of 12 – 20 persons although larger groups can be managed. Ideally there should be a diversity in the participants and alternative views are encouraged. Given the novelty of scenario planning, it can often be difficult to get people to commit the time needed to undertake these exercises. This is certainly a difficulty we currently face. Even when the exercise is being done it is extremely difficult if one has not been able to devote the time to understand where it is going. Since the process takes time, there is a certain degree of inherent frustration.

Scenario Agenda (Kruger)

1. Identification of the Key Question.
2. Identification of Drivers – working groups – Rich Picture analysis.
3. Presentation and grouping of drivers using PESTEL (Political, Economic, Social-Cultural, Technological, Environmental, Legal factors) analysis.
4. Development of predictability matrix and plotting of drivers.

Post-Kruger follow-on and preparations for November 2006:

1. Re-grouping of drivers and reduction to 10 driving force clusters with extreme values table.
2. Re-plotting of clusters onto predictability matrix.
3. Construction of scenario matrix and determination of scenario logics.
4. Determination of causal structure and interdependencies (causal diagram).
5. Identification of scenario plot.
6. Construction of scenario narratives.

1. Key Question Identification

The identification of the key question gives clarity and focus to the scenario process. If there is no consideration of this in the beginning, then the group might not pick up the critical drivers. This said, the group might not agree on the wording of the key question until later in the process – once they have considered some of the drivers.

- a. What are you trying to address?
- b. Identifying the key question is often quite problematic for groups and requires several iterations.
- c. The process shows how differently we perceive the world around us and how differently we prioritise issues.

- d. Often in the scenario planning process the “final” key question is only identified at the end of the exercise.
- e. The key question is important though to provide focus for the process and a context in which to identify the driving forces. The time frame determined by scale will also give you what is called a scenario horizon.

The KEY Question Identified at Kruger is:

What combination of land use and tenure will enhance system health productivity and resilience (sustainability) of the social ecological system of the GLTFCA

2. Identification of the Default Scenario and Driving Forces

The process of identifying the driving forces is done in working groups and the first part of the process is to try and get participants to open their minds and visualize their world from a different perspective. This may be done using several techniques. At Kruger a *Rich Picture* technique was used where participants drew the GLTFCA – but they are not allowed to use any words in their diagram. Understanding the world around you is part of understanding the default scenario – the default scenario includes those factors that are operating in “real time” that are influencing or driving our decision making now.



Fig 2. Developing the Rich Picture

The Rich Picture will assist participants in identifying drivers, and these drivers may then be listed and others identified and added.

Understanding drivers:

There are a range of driving forces that will impact on any given issue. Some of these drivers will be localised while others will be external.

- a. Understanding driver scale is very important, along with understanding that people will see different drivers.
- b. Participants are asked to brainstorm and identify as many drivers as they possibly can.
- c. These drivers can then be grouped using a PESTEL or similar tool into similar categories.

3. Grouping Drivers and developing Driving Forces

The process of identifying drivers results in a large pool. Many of the drivers identified in these exercises are identical, some are worded differently but are essentially the same – all invariably are a component of a larger set. With the large accumulation of drivers there needs to be a mechanism for reducing the dispersed data set into more manageable sets. There are again different ways of doing this. At Kruger we used a local variation of the PESTEL analysis. Ideally, this would go through several iterations and discussions would be allowed to flow. Drivers would then be categorized and listed in a driving forces table that also shows the “extreme value” (this becomes important later on), but the extreme values show that the driving force can be either/or. Unfortunately, time constraints limited the amount of time we could devote to this exercise at Kruger and we had to rapidly move on to the predictability matrix. The following table was therefore developed post Kruger. This table will be reassessed for validity at the next meeting in November.

Driving Force (clusters)	Extreme Values	
1. Human Wildlife Conflict	High	Low
2. Regional Security	Unstable	Stable
3. Resource Use / Water Supply	Inadequate	Adequate
4. Emergent diseases/Alien invasive	Rampant	Controlled
5. Stakeholder perceptions	Negative	Positive
6. Ethnic tension	High	Low
7. Technology	High Impact	Low Impact
8. Socio Economics and HIV	Negative	Positive
9. Land Use	Unsustainable	Sustainable
10. Veterinary Health Measures	Poor	Effective

4. Developing the Predictability Matrix

Having identified the drivers and driving forces the next stage is to plot these on to a predictability matrix. The predictability matrix is critically important because it highlights the relationship between driving forces and brings out the elements of uncertainty that are operating in “real time.”

The predictability matrix:

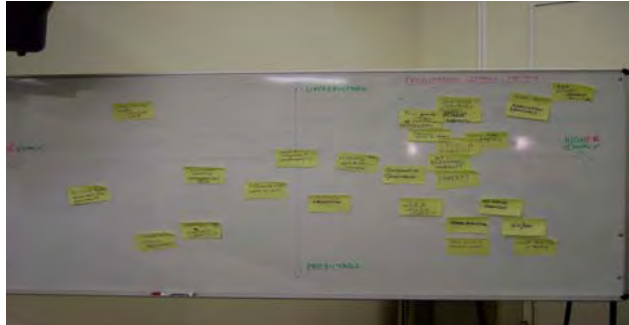


Fig2. Plotting the predictability matrix.

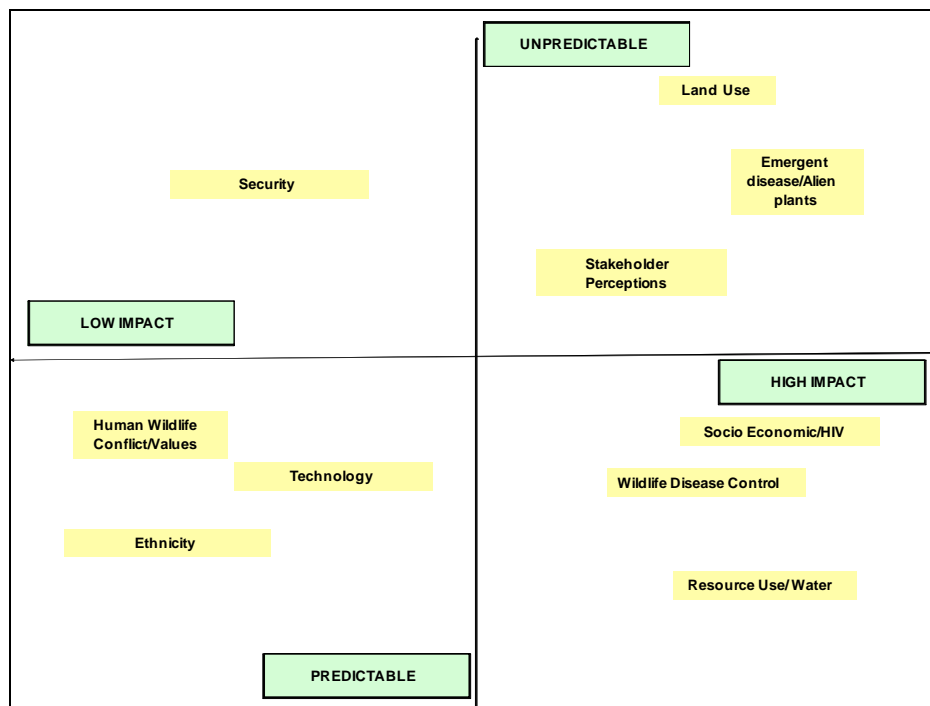


Diagram 1. The Predictability Matrix Showing Driving Force Plots

5. Constructing the Scenario Matrix

Scenario planning is about dealing with uncertainty in complex systems. The scenario matrix is therefore about addressing this uncertainty without losing the relevance of the certain or predictable drivers. The scenario matrix is constructed by choosing the *two most significant uncertain driving forces* from the driving forces table and then using them within the predictability matrix (as this has not been done in group session yet the author has chosen for now the following for the *x* and *y* axis: **Land Use** and **Stakeholder Perceptions**). **Land Use** includes: landuse practices, agricultural practices, biodiversity conservation, water conservation and management, human and animal population density. **Stakeholder Perceptions** contains the following drivers: public perceptions of the TFCA concept, agricultural policy, political perceptions of the TFCA, policy decisions.

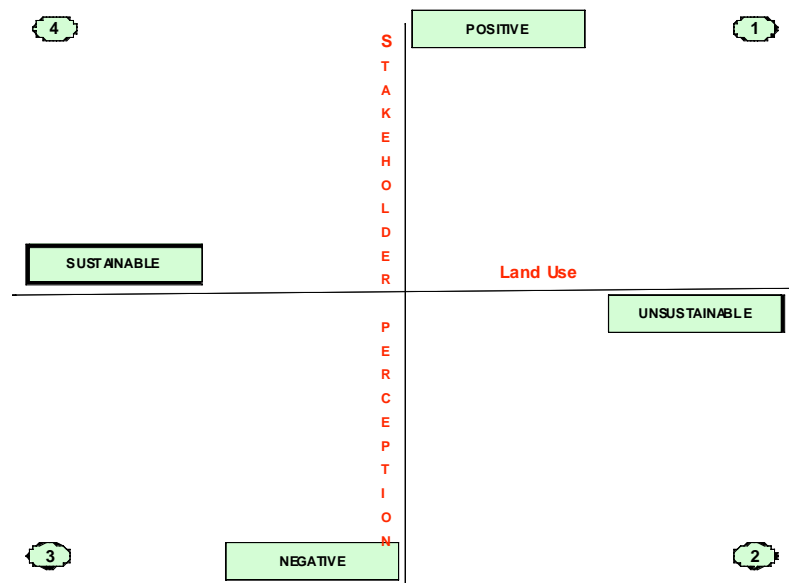


Diagram 2. The Scenario Matrix

In the above diagram each quadrant forms the basis for a scenario as follows:

Scenario 1 – Stakeholder perceptions are positive but land use is unsustainable.

Scenario 2 – Stakeholder perceptions are negative and land use is unsustainable.

Scenario 3 – Stakeholder perceptions are negative but land use is sustainable.

[illegible]

✓ ○ ✕ ✕ ✕ ✕ ✕

In looking at the causal diagram it appears that in this plot the following seems to be happening:

Economics (and its sub set of drivers) and technology are the big drivers in this scenario. These drivers positively relate to human health, emergent disease, ethnic tensions, regional security, human / wildlife conflict and veterinary health. However, they create conditions of increasing demands on resources and in particular for this semi arid zone – pressure on water supply. Improvements in veterinary health also mean higher densities of animals, both wild and domestic, placing greater pressure on fragile ecosystems. Improved human health has also meant increasing human populations and greater demand on natural resources, food, fuel and water. This is a system that has expanded on the back of its natural capital and heading for an environmental calamity. A wild card driver (not shown) like a massive sustained drought would alter this scenario.

It is important to remember that none of these scenarios are predictions, but all of them are plausible. As planners it is important to understand how the different drivers will respond in different scenarios. If we take a look at Scenario Plot 3 below, we can see how the drivers change their relationship to each other:

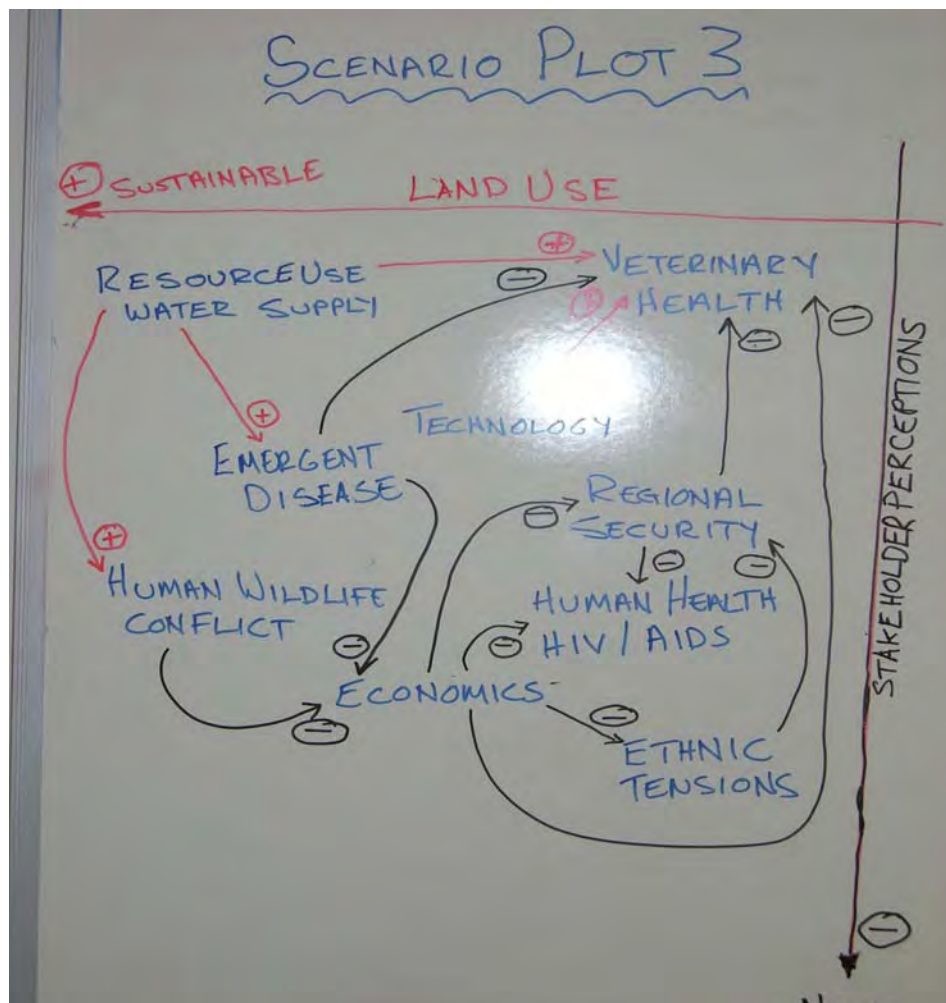


Diagram 4. Scenario Plot 3

In Scenario Plot 3 stakeholder perceptions have declined while land use has become more sustainable. In this plot a declining economic and political climate has resulted in a range of problems from increased instability in terms of regional security, rising ethnic tensions and declining human health. Emergent disease starts to play a role in human and animal health while the level of human / wildlife conflict increases. Technology continues to play a positive role but its impact is limited by the poor economy and limited access to its benefits. Resource use and water supply improve as more areas are allocated for resource conservation and rural populations migrate to urban areas in search of money.

8. Creating the Scenario Narrative

The scenario narrative is a group construct that enables the group to effectively describe the relationship between the drivers in a manner that is easily remembered through a simple story. Each plot is given a catchy name that evokes the essence of

what is occurring in the plot. For example a name for scenario Plot 1 might be “Shooting the Rapids,” as this would evoke a sense of pace and activity but perhaps also an element of heading into an uncertain future. The group would then develop a story that might be a newspaper article set ten years from now that describes an event and build into its storyline the drivers identified in the matrix.

3. Key Implications

It is perhaps too early to draw out any significant conclusions from the work completed thus far. However what is clear from the field trips, meetings and scenario workshops is:

- Economic drivers in the region, especially South Africa, are going to have a major impact on land use. Global economic drivers will also have a direct impact on the area in respect of mining operations, fuel costs and foreign tourism. All of these are in a critical balance and there is a considerable degree of uncertainty in their future direction. Recent exchange rate fluctuations and the tightening of monetary policy by the South African Reserve Bank will have implications for all stakeholders in the GLTFCA. In addition to this, the decline in donor funding (in particular as related to the environment) will have implications for this and similar types of programs.

On the positive side South Africa has enjoyed consistent economic growth over the past ten years and this has resulted in inward investment into the GLTFCA, primarily in the form of investment in the tourism industry. In Mozambique the economy has maintained steady growth for ten years and direct foreign investment, particularly in the tourism sector, has continued to grow over the past five years.

- In the Kruger workshop, regional security / stability was noted as an area that appeared... stable. The same conclusion might not be reached in Zimbabwe where there is a high degree of uncertainty regarding the political and economic future. This uncertainty has resulted in a crisis of confidence in government and social structures at all levels. The reported de-population of districts bordering South Africa is very worrying and the long-term implications of this needs more careful examination. This in turn poses very real and significant security threats for the region that are largely being ignored by all, perhaps because they do not manifest themselves in the same way security threats did in the past (these are not armed conflicts). While this scenarios process is not specifically to look at political

scenarios, given the unstable situation in Zimbabwe a dramatic political event would be in the same category as a wild card natural event like a prolonged drought. It might be argued that we are already in this event, we just have no sense of positioning of the time scale. The Kruger workshop noted the influence of ethnic tensions [for the purpose of this exercise, this is intended to include racial tensions that continue to exist (post-apartheid) and influence political and public perceptions over the use of land and natural resources].

- Emergent disease is an issue that has attracted media attention around the globe with concern over avian influenza. The Kruger workshop placed emergent disease as having a high impact and high unpredictability. There are concerns over a range of diseases and their implications for human and animal health, and corresponding economic and social impacts.
- Human health issues and in particular the impact of HIV is a major concern. With one of the highest infection rates in the world, southern Africa will feel the effects of the disease for years to come. With an aging rural population dependent on remittances from working youth in urban areas, the loss of these remittances will place an enormous strain on already stretched social welfare systems. In Zimbabwe, where the impact of AIDS is exacerbated by an economic collapse, the dependence on natural resources increases significantly.
- The emerging scenarios show technology as an important driver but limited by its close links to economic performance. As with all debates about technology, there are its proponents and detractors. However, technology will certainly have an important role to play in respect of human and animal health, social development and communication.
- All of these driving forces will have significant influence on the way land is used in the GLTFCA. In much of southern Africa land tenure and land use are core to social and political debates. Even in Mozambique, where all land is owned by the state, the right of access to land is still heavily contested as it is in the GLTFCA. In South Africa the issue of land remains a festering wound carried over from its apartheid past, with a land ownership imbalance based on racial and socio-economic status. With increasing human population densities in communal lands adjacent to commercial and state land there will be increasing calls for reallocation of these properties. In Zimbabwe much of the private commercial land owned by white Zimbabweans has been expropriated by the state for redistribution to

wealthy blacks or people commonly referred to as war veterans. The situation in Zimbabwe remains in a state of flux in line with the economic and social crisis.

4. Lessons Learned

The scenario planning process being undertaken in AHEAD for the GLTFCA has shown the importance of allowing local needs and demands to dictate the pace of the process. It has also shown that trying to compress the scenario planning process too much will not produce the desired results. The author's attempt at fast tracking the process in Kruger fell short of expectations and demonstrates the need to conduct at least three two-day workshops per site even if these need to be spread out over a longer time-frame. Fortunately the process that is being undertaken is flexible enough to cater for the changes as it develops. And given longer-term budgetary uncertainty, such flexibility is helpful in dealing with variations in funding levels.

5. Next Steps

The next stages of this process will be to:

- Hold a follow-on workshop in Kruger to review the predictability matrix, run through the driving forces, redevelop the scenario matrix, scenario plots and scenario narratives.
- Delineate the key implications and strategic responses to the scenarios.
- Validate existing plans and strategic responses will be done by testing them in each scenario.
- Run a scenario workshop in Zimbabwe under the auspices of the South East Lowveld Wildlife Association.
- Run a scenario workshop in Mozambique under the auspices of the TFCA unit in the Ministry of Tourism.
- Link the scenario planning process at technical levels to that of the community level process being undertaken by CASS and INR. The appropriate vehicle for this is AHEAD.
- Ensure that the scenario planning process is addressing the needs and concerns of the different AHEAD modules.
- Develop a monitoring and tracking system for drivers and driving forces.
- Develop funding proposals to keep the process running.

AHEAD-GLTFCA– INTERIM MEETING

Record of the Interim Meeting held on the 19-20th October, 2005

Skukuza, Kruger National Park

1. WELCOME AND INTRODUCTIONS

The meeting opened at 14.15 in the Veterinary Unit Auditorium at Skukuza. The Chair, Dr. Danie Pienaar, Director of Research, extended a warm welcome to all attending the Interim Working Group Meeting. Since there were several participants who were attending an AHEAD-GLTFCA meeting for the first time the Chair invited the 18 participants to briefly introduce themselves. A list of participants and contact details are provided in Appendix #1. Participants were asked if there were additional items they wished to add to the agenda – none were forthcoming.

Apologies: Apologies were received from: Emily Lane, Chris Foggin, Michael Murphree, Marshall Murphree, Carlos Pereira, Steve Osofsky, Wilna Vosloo

2. UPDATE FROM RECORD OF 5TH FULL WORKING GROUP MEETING (17TH-18TH FEBRUARY, 2005- minutes posted at http://www.wcs-ahead.org/workinggrps_limpopo.html) AND REVIEW OF PROGRESS ON CONCEPTS AND PROJECT DEVELOPMENT (Facilitated by David Cumming/Mike Kock)

The Draft Summary Project Table from the 5th Working Group Meeting, annotated and updated before the meeting by David Cumming, was used as a basis for examining and discussing progress in developing concepts and projects. The table was further updated during this session (see Appendix #3). The following progress was reported and discussed:

Theme #1: *Overarching conceptual framework to facilitate integrated and inter-disciplinary approaches*

a) **Coordination and Project start up.** Support by WCS for the coordination and development of the AHEAD-GLTFCA programme was continuing in the form of support for David Cumming's coordinating role and Steve Osofsky's and Mike Kock's input to developing the programme. Major start-up funds for the development and coordination of the larger programme were still being sought.

b) Development of inter-disciplinary frameworks and models

As planned at the 5th Working Group Meeting in February '05, a small workshop was held in Skukuza in May '05 to examine a conceptual framework for the programme. The results of the workshop are reported upon in Agenda Item 2 below. A further encouraging development has been a USAID Associates Grant (US \$102,500) to WCS to further develop the conceptual framework, start the scenario planning work, and to support programme coordination and development. Under this grant David Cumming will continue to work with a core group to develop the overarching conceptual framework, Mike Murphree will take the lead on scenario planning and Mike Kock and Steve Osofsky will continue their involvement in these activities and in programme development. The grant runs from October 2005 through September, 2006.

c) Baseline indicators. 1. *Participatory surveys of animal and human diseases, livelihoods and socio-economic baseline data in communal areas of the GLTFCA*

A preliminary Log Frame and Objectives Tree for a GEF Medium Sized Project and PDF A were developed and discussed with GEF Desk Officers in Nairobi. The project design focused on baseline surveys, developing the conceptual framework and scenario planning with provision for strategic disease-related biodiversity and rural development and policy interventions in communal

lands of the GLTFCA. However, during the discussions with GEF staff it became clear that an essentially disease-focused and largely research approach would not easily fit within the current GEF programme. This being the case a full PDF A proposal was not submitted. As a tri-national project and given the current balance of available GEF funds for the countries concerned it was also deemed unlikely to score high. With the already large injection of funds for TFCA development in Mozambique, further GEF funding under the AHEAD-GLTFCA programme was unlikely. See notes under major heading 4. below as well.

Theme #2: Animal health and disease.

a) Epidemiological studies

1. BTB, FMD and Brucellosis in the Sengwe Communal Land. Some 2000 cattle had been examined with no BTB positives being found. The tests for FMD and Brucellosis were still to be completed. The second phase of the project, testing for BTB in buffalo, was to be done once funding was available.

5. Coordinating pathological data/sample analyses, and GIS database. The proposal had been developed but was not yet funded. Rosa Costa was working with Emily Lane to develop a Mozambique component and to train field veterinary staff in the collection of material – to begin in November 2005. Nick Kriek noted there had been a workshop earlier in the year at the National Zoological Gardens (NZG) in Pretoria to examine the development of a national tissue data bank (Bio-bank) and there were plans to link this to the PPF Veterinary project's GIS database being developed by Louis van Schalkwyk. Dr Paul Bartels was a prime mover of this initiative (Biobank – NZG) through his involvement with the Wildlife Biological Resource Center. The project was receiving support from the NRF (National Research Foundation in South Africa). It would be important for Emily Lane to discuss further developments and links to the biological (blood, tissue and other samples) data-base with Paul Bartel.

6. Monitoring Tsetse in the GLTFCA. Fred Potgieter reported that he had been discussing the establishment of a tsetse monitoring programme with Peter van den Bosche in Brussels and exploring the possibility of EU support for this. David Cumming reported that monitoring for the presence of tsetse in the Gonarezhou National Park, using targets and sentinel cattle herds, had found no recent evidence of the fly.

7. BTB database and research programme (MRI). Roy Bengis reported that the recent BTB survey in southern Kruger found macroscopic lesions in approximately 1 out of 3 of buffalo examined, and the rate of infection was likely to be higher. Culture rates in 2005 were similar to those in 1998. This level was similar to that recorded in the last survey and the disease may be stabilizing although a high proportion of young animals were infected with BTB. Two buffalo had died of advanced BTB (miliary) in the north of the park 8km from Pafuri close to the Zimbabwe border. Sporadic cases of BTB were appearing in kudu, warthog and lions. The National Veterinary Services were now testing cattle on the western boundary of the Kruger National Park. No positive cases had been found in Mpumalanga Province. Limpopo veterinary personnel have been tied down recently with FMD outbreaks. Anita Michel indicated that culture results from the latest round of BTB testing would be available in December – the next meeting of the BTB study group will be in January 2006.

The MRI BTB programme was expected to continue and Nick Kriek noted that a meeting was scheduled to be held in Pretoria next week. Claire Geoghegan, a PhD student of Wayne Getz, was likely to be working on BTB in the Hluhluwe area examining disease linkages between the park and surrounding communal lands.

Additional discussion: Fred Potgieter reported that OVI had submitted 24 project proposals (to the ARC?) and all had been funded. OVI had also received a set of new equipment for DNA and related analyses which would greatly assist in their epidemiological work. OVI would also be examining climatic effects on the epidemiology of *Theileria parva* following a recent transmission of the disease from cattle to cattle in the Bloemfontein area (Koos Coetzer from OP). Fred noted that there was a Corridor Disease outbreak in the Free State where no brown ear ticks have been found and that we

may be seeing climatic influences on disease spread and occurrence. It would be worth examining historical data on tick distribution and changes that may be occurring with global warming. Funding is available for further MCF work – an important disease at the interface between wildlife and livestock. Work is being carried out in KwaZulu-Natal on trypanosomes and tsetse where there is a disturbing resurgence of trypanosomiasis and aspects of virulence are being examined.

Theme #3: Landuse, ecosystem goods and services & animal health

There was no progress to report under this theme.

Theme #4: Human livelihoods, animal health and ecosystem goods & services (Ecosystem health)

a) Scenario planning and participatory exploration of land use options

1. Scenario planning and modeling at local community and village levels and developing approaches and methodology for “local adaptive scenario planning” – a 5 yr programme at least. Funding to start this project had been received under the USAID Associates Grant to WCS, and the Sand County Foundation (SCF) has made a grant of US\$20,000 to Michael Murphree to pursue a project on community based scenario planning. This was a competitive bid won under an SCF small grants programme for innovative approaches to community based natural resource management. CASS are presently working with IDRC to develop the larger project outlined by Marshall Murphree at the 5th Working Group Meeting in Pretoria.

2. Issues of larger scale landuse planning, placement/removal of fences etc. (Biosphere Reserve concept for SEL of Zimbabwe?) (Need for spatial info. and remote sensing data/interpretation). A short feasibility study focusing on the realignment of veterinary fences was conducted in May by the Zimbabwe Department of Veterinary Services and the National Parks and Wildlife Management Authority with support from CIRAD. Discussions involving government agencies, local authorities and stakeholders in the SEL indicate that an extension of the TFCA concept to link the GLTFCA and the proposed Shashe-Limpopo TFCA is a distinct possibility. The matter is being considered by the National TFCA Conservation and Veterinary Sub-Committee.

Theme #5: Policy support and capacity building

No progress has been made in funding for the projects listed under this theme. A policy component was included under the GEF proposal. However, WCS has been working with Enos Shumba (IUCN and SADC Secretariat in Gaborone) who has been drafting the SADC Regional Biodiversity Conservation Strategy, and components dealing with the *AHEAD* approach and the importance of diseases at the livestock/wildlife/human interface in the conservation of biodiversity have been included in the draft strategy, due out in early '06.

Theme #6: Communications and outreach

The USAID/WCS Associates Grant includes some provision for ongoing coordination and meetings of the AHEAD-GLTFCA Working Group and for the development of agreements and data sharing protocols.

Further Discussion

1. Roy Bengis outlined a case of cyanobacter poisoning in man-made impoundments leading to an outbreak of mortality in wildlife drinking from these impoundments. The organism had been identified and could be associated with unusually high water temperatures and high hippo populations. These infections can be confused with anthrax or botulism.

2. Nick Kriek noted that there may be a need to consider the role of residues and contaminants in the GLTFCA system. The GLTFCA was at the lower end of the Limpopo-Save catchments and there could be several contaminants and residues (e.g. those mimicking hormones) that could affect the health of animals and the wellbeing of humans in the system. It was agreed that this subject could

well be developed as an additional theme or module with the AHEAD-GLTFCA programme. Nick Kriek added that NUFU were supporting research in veterinary faculties on this issue.

3. Roy Bengis said that on the basis of recent and current weather patterns Kruger NP was due for another outbreak of anthrax but this had not occurred. He hypothesized that the 2001 floods in the Limpopo system had scoured out and possibly washed away spores that were normally resident in stagnant pools along the rivers in the Limpopo system.

4. Markus Hofmeyr suggested that Corridor Disease maybe more problematic than trypanosomiasis particularly with the rapid commercialisation of wildlife and spread of game ranching. The valley bushveld tick has been found in the Willem Pretorius Game Reserve in the Free State and this is probably a result of game translocations – host and disease spread as a result of game movements needed critical examination. Fred Potgieter noted that the wildlife/human/livestock interface has increased dramatically with the increase in game ranching and with it the increased risk of the transfer of pathogens. Harry Biggs commented about the global movement of pathogens and introduction of alien invasive species. Roy Bengis commented that game farmers were not allowed to move animals with any visible ticks and he did not consider rhino to be a major problem. Mass capture and movement is the real problem due to inadequate surveillance and monitoring, and treatment

3. REPORT BACK ON FRAMEWORK MEETING HELD IN MAY 2005 AND DISCUSSION ON CONCEPTUAL FRAMEWORKS (Harry Biggs & David Cumming)

Harry Biggs gave a brief Power Point presentation to illustrate aspects of the output from the May meeting in Skukuza on the Overarching Conceptual Framework for the AHEAD-GLTFCA programme. This was a report of work in progress and the full report of the meeting is still being written-up. The Framework meeting opened with an outline of the AHEAD GLTFCA programme and the alternative approaches that could be adopted in developing a conceptual framework and models of the system. The meeting went on to use components of resilience analysis, complex systems, and the Millennium Assessment framework for examining ecosystem goods and services, to explore the dynamics of the GLTFCA system over a period of three and a half days.

The first step involved bounding the system in broad terms and this was followed by developing time lines that highlighted major shocks to the system within each of the countries and across countries. This exercise included an outline of the key drivers of change in the system over time. The group then analysed goods and services relating to wildlife and livestock in the communal lands of the GLTFCA and it was clear that there were considerable differences between those in South Africa and those in the neighbouring countries of Zimbabwe and Mozambique.

The group then moved on to develop a preliminary systems model (diagram) reflecting the major linkages affecting livestock, wildlife, disease and livelihoods in the communal lands of the GLTFCA. For the most part this diagram was based on perceived dynamics in the Mozambique and Zimbabwean communal lands

Following the development of the systems diagram separate components were examined in relation to the main themes of the programme and key research needs were identified (e.g. Appendix 3).

A stakeholder/participation analysis was completed and Michael Murphree gave a Power Point presentation followed by an extended discussion of the role of scenarios and scenario planning in the development of the TFCA.

4. FOLLOW UP ON THE GEF PROPOSAL

David Cumming outlined the work that WCS (Steve Osofsky and David Cumming) had done since the 5th Full Working Group Meeting in February 2005 and the May 2005 'Frameworking' meeting to develop a PDF-A proposal to the UNEP GEF Office in Nairobi. Alan Lambert, who had been very encouraging, moved to South America and it was necessary to establish relations with his replacement. Before taking the step of developing a full and detailed proposal we felt it would be

advisable to explore ideas with the UNEP GEF office in Nairobi by way of a preliminary Objectives Tree and Log Frame for the work we had in mind within a budget of approximately one million US dollars. The preliminary proposal focused on the review and synthesis of existing information, participatory field surveys to gather up to date information on the current status of disease and livelihoods in the communal lands of the GLTFCA, developing conceptual models and scenario planning, and using this information to develop policy briefs and strategic pilot projects focused on disease mitigation strategies at local levels. However, the linkage between disease management and biodiversity conservation was not something UNEP GEF had experience in supporting and the (applied) research focus was also unlikely to gain UNEP GEF support. A variety of alternative approaches and strategies were explored with the Nairobi office, and WCS decided to shelve further development of a GEF proposal for the time being- unless AHEAD GLTFCA Working Group members felt strongly about pursuing UNEP GEF.

The possibility of developing a South African proposal was discussed at some length and may be picked up by SANParks. Given the already high World Bank investment in the Mozambique portion of the GLTFCA, there was little likelihood of further support being forthcoming from GEF within the Mozambique component of the GLTFCA. UNEP GEF was also unlikely to support work in Zimbabwe at this time.

5. LETTERS OF UNDERSTANDING AND INSTITUTIONAL COMMITMENTS

The initial draft Letter of Understanding which was circulated earlier in the year envisaged a full set of signatories on a single document. Given the logistical difficulties of circulating a single letter for signature and the inclusion of agency Logos as it developed, it was decided that single letters, signed by one agency on their letterhead, would be a more suitable approach.

To date the Letter of Understanding (See Appendix # 4) has been signed by the following agencies:

Center for Applied Social Sciences (CASS), University of Zimbabwe,
Tropical Resource Ecology Programme (TREP), University of Zimbabwe,
Department of Veterinary Services, Ministry of Agriculture, Zimbabwe
Research Division, Kruger National Parks, South Africa
Onderstepoort Veterinary Institute, ARC, South Africa
Wildlife Epidemiology Group, Dept. of Environmental Science, Policy and Management,
College of Natural Resources, U C Berkeley
World Wide Fund for Nature – Southern Africa Regional Programme Office (WWF-SARPO)
Wildlife Conservation Society

Several other member agencies of the Working Group have indicated that they intend signing the LOU and expect to do so in the near future.

6. RELATED RESEARCH DEVELOPMENTS AND LINKAGES

6.1 TFCA programme Mozambique (Jorge Ferrao)

Jorge Ferrao reported that the next phase of the TFCA programme in southern Mozambique would be starting soon. The overall funding would amount to US\$34 million and comprise grants from the World Bank IDA, JICA and the World Bank GEF. There were five main components to the programme:

1. Strengthening policy and conservation legislation
2. Integrated District Development Plans for rural development
3. Community / private sector partnerships and tourism development

4. Protected areas management focusing on biodiversity conservation and including support for the establishment of a wildlife veterinary unit.
5. Monitoring, evaluation and programme management.

The Lebombo TNP would be a major focus of the programme where it would be working with the Peace Parks Foundation, but the programme would also include the GLTFCA and Chimanmani TNP.

6.2 PPF Veterinary Programme (Nick Kriek)

Professor Nick Kriek (formerly Dean of Veterinary Science at the University of Pretoria) informed the meeting that he had joined the Peace Parks Foundation (PPF) at the beginning of October to head the PPF Veterinary Programme. He would continue to be based at Onderstepoort. He emphasized that the unit would remain small and its primary function was to facilitate the development of capacity, both in terms of training and resources, to enable existing organisations in the region to tackle key veterinary problems that affected the development of peace parks in the SADC region.

- no intention of competing with or overlapping with the AHEAD-GLTFCA programme
- will be linking with a wide range of agencies in the region
- information management important to all involved
-

Professor Nick Kriek gave the following Power Point Presentation.

The TFCA-VP Nick Kriek Peace Parks Foundation

Context

Objectives of PPF:

- It facilitates the
 - The development of Transfrontier Conservation Areas, and
 - The development of human resources
- To support
 - Sustainable economic development,
 - The conservation of biodiversity, and
 - Regional peace and stability

Context – veterinary programme

- Objectives of PPF
- Economic needs of the subregion
- Changing nature of borders
- Changing epidemiology of diseases
- Changing natural phenomena
 - Global warming
 - Deforestation
 - Bush encroachment
 - Small-scale farming

Threats

- Cannot sustain development of TFCAs
- Conservation is not sustainable
- Ecotourism does not generate sufficient numbers of tourists
- Need for ground impinges on conservation areas
- Pressures from interface communities
- Diseases of humans and animals

Diseases

- Wildlife
- Domesticated animals
- Livestock
- Interface
 - Wildlife
 - Domesticated animals
 - Human
- Economic impact

Diseases

- Transboundary animal diseases
 - Foot-and-mouth disease
 - Theilerioses
 - Trypanosomiasis
 - Tuberculosis
- Endemic diseases
- Emerging diseases
- Zoonotic diseases
 - SARS, avian influenza, BSE (political diseases)

Economic and social impact

- Increased risk of spread of serious diseases between countries:
- Increased efforts needed to contain these diseases
 - Adverse impact on the macro-economy

Economic and social impact

- Local (interface) socio-economic stability
- Food security and food safety
- Increased exposure of communities to zoonotic diseases at the interface
- Increased risk of disease transmission
 - domestic animals to wildlife and
 - the resultant negative impact on biodiversity

Goals of the TFCA-VP

- To facilitate the
 - identification,
 - prioritisation and
 - finding solutions for the veterinary-related health challenges created by the development of Peace Parks
- Philosophy of the OIE and FAO,
- Zonation, and
- Ongoing, integrated disease management in SADC

Goals of the TFCA-VP

To facilitate on SADC basis:

- Multidisciplinary and multi-institutional, problem-based veterinary-related research (existing networks),
- The development and utilization of standardised methodology (management, diagnostics and research),
- The development of scientific networks
- Integrated information management, and
- The development of regional contingency plans for outbreaks of disease

Goals of the TFCA-VP

To facilitate the

- Creation,
- Expansion and
- Utilization of regional human and infrastructural resources

Operational plan

- Obtain regional SADC cooperation and acceptance
- Obtain approval and support from each country for the implementation of the TFCA-VP

Operational plan: specific activities

- Disease monitoring and surveillance
 - Surveys: detection of new, emerging and re-emerging diseases
 - Surveillance and monitoring
- Information management
 - Develop
 - A generic data-capture system and veterinary portal
 - A centralised data repository
 - GIS ability with veterinary application
 - Sample banking and storage (NRF)

Operational plan

Facilitate:

- Research (integrated veterinary research including public health)
- Education and training
- Infrastructure and equipment
- Community interaction In association with existing initiatives

Operational plan

- To provide sufficient information to allow
 - Epidemiological modelling and risk analysis based on available data, and the
 - Development of future integrated, regional management plans
 - To negate the potential negative impact of disease on the development of TFCP/As

Operational plan

- AHEAD
- Faculty of Veterinary Science

Discussion:

Harry Biggs noted that there was overlap between the two programmes and thought it would be important to explore potential links between PPF and WCS. Nick Kriek noted that the PPF Veterinary programme covered the sub-region and had established strong institutional links within the region. A constructive and wide-ranging discussion on cooperation and seeking win-win outcomes between the various programmes in the GLTFCA followed. It was noted that human health issues and involvement of the social sciences (particularly economics) were still not adequately covered in the AHEAD-GLTFCA programme, but this was something being addressed. Conrad Steenkamp drew attention to the TEBA archives (monthly reports on labour recruitment) which contained a remarkable record of the past events influencing the recruitment of labour from the GLTFCA region.

6.3 SANParks (Peter Buss)

The following main points were covered in a briefing by Peter Buss:

- Most of SANParks effort has been focused on BTB. Thresholds of Potential Concern (TPCs) for the disease were being established and being tracked.
- Animal disease now seen, at a national level, to be a risk and threat to biodiversity and new legislation in SA now requires consideration of these risks and compliance with the Diseases Act. This in turn requires policy analysis and research.
- SANParks is involved with a range of actors (e.g. AHEAD, OP, PPF) and it would help if there were greater integration between these programmes and activities.

Discussion:

In the ensuing discussion Roy Bengis noted that the National Directorate has over the past 40 years focused on surveillance and threats to agriculture but it is now broadening its mandate to include veterinary public health issues and the use of wildlife by the public. Translocation hazards are also being examined. Harry Biggs noted that SANParks is examining the appointment of a Disease

Research Manager and a Social Science Research Manager. The Kinsey Report had recommended a tripling of research effort for SANParks to meet its biodiversity conservation mandate.

6.4 Transboundary Protected Areas Initiative (TPARI) (Conrad Steenkamp)

TPARI is essentially a research network focusing on young researchers, useful problem solving, and avoiding “research fatigue” in its interactions with communities. It will in the future be doing more on social impacts assessments and post baseline studies of achievements in TFCAs. The text from Conrad Steenkamp’s illustrated Power Point presentation was as follows:

Transboundary Protected Areas Research Initiative Iniciativa de Investigação de Áreas Protegidas Trans-Fronteiriças

Overview

- Research network running under auspices of IUCN
- Initial funding from NSF via CMU HDGC
- Human and social dimensions of TBPAs / TFCAs in southern Africa
- 28 researchers over last two years
- Two post-doctoral fellows: tourism (Anna Spenceley) and CBNRM survey/assessment (Wolfram Dressler)

Relationships

- Key partnership: IUCN South Africa
- Key relationships: DEAT, SANP, PPF, EWT, SAVANNA consortium, WCPA-IUCN, TBPA Task Force, AHEAD
- Southern African academic partners from:
 - _ Wits - BMW Chair of Sustainability, Social Anthropology, Sociology, Wits Rural Facility, Office of Disaster Preparedness in Africa
 - _ UJ (Environmental Science, Philosophy) US (Sociology & Anthropology, Philosophy)
 - _ University of Cape Town (Anthropology)
 - _ EMU (Faculty of Science, Dept of Geography)
 - _ University of the Western Cape (PLAAS)
- North America:
 - _ Bates College, Carnegie Mellon University, Johns Hopkins, Indiana, Georgia, Berkeley Calif., British Columbia, Montana, Michigan
- Europe:
 - _ Wageningen, Vrije Uni. Amsterdam, TU Berlin, Univ. Finland, Univ. Mainz.

Modes of collaboration

- Formal inter institutional MoU
- Formal researcher MoU
- Informal agreements & informal participation in network
- Benefits:
 - _ Library & research platforms
 - _ Proofing of research topic
 - _ Research design
 - _ Logistical support & registration procedures
 - _ Field mentoring (academic)
 - _ Networking (incl. commun) & research synergies
 - _ Funding & fundraising
 - _ Exposure and peer review (teleseminars)

A criterion for suspending an MoU:

Any party to this MoU's work or behaviour results in substantial or persistent tensions and dissatisfaction on the part of conservation officials or local people, without the benefit of that work/behaviour being evident. That is, it is expected that researchers will sometimes deal with sensitive topics and TPARI

supports the right of researchers to do so. Simultaneously research has to be conducted in a way that is not disruptive on the local level.

Research themes

- Human-environment relations:
 - _ Climate variability, environmental disaster, resource limitations,
 - _ HIV-AIDS & resource use
- Decision-making and governance:
 - _ Political ecologies, planning & participation
 - _ PA Management and co-management
- The social and economic framework:
 - _ Land rights, resource rights and livelihoods
 - _ Tourism development, economic development and beneficiation
 - _ Cultural landscapes, cultural histories, cultural & social impacts

Orientation

- NB: Development of new generation of young researchers
 - _ Synergies between researchers: e.g. 7 researchers from different universities on research in Mozambique
 - _ Targeting & relevance of research
 - _ Retention of research & feedback
 - _ Relations between key actors: researchers, local people, conservation practitioners - joint problem solving

Projects

- Senior researchers, post docs & PhDs
 - _ Digitisation of TEBA Archives
 - _ Multi-objective decision-making model for Kruger to Canyons (looking for funding) (Senior)
 - _ Indigenous knowledge systems and Disaster preparedness - Office of Disaster Preparedness
 - _ Survey & assessment of 'CBNRM' interventions (Post doc)
 - _ Tourism investments in GLTP (post doc)
 - _ PAs: does collaborative management make a difference? Comparative study (PhD)
 - _ Agroforestry study in Limpopo National Park (PhD)
 - _ GLTP history and NGO relations (post doc)
 - _ SANP approaches to engaging community (PhD)
 - _ GLTP, ENSO events & livelihoods (PhD)
 - _ Agricultural development project next to park (PhD)
 - _ Do TBPAs help? (PhD)
 - _ States, markets and conservation (PhD)
 - _ Woodland conservation & EE: comparative SA and Nigeria (PhD)
 - _ Understandings of land & place among the displaced people from the GLTP (PhD) MA/ MSc
 - _ Community participation in Kgalakgadi: park perspective
 - _ Network Analysis of 2 villages
 - _ 2 Cultural tourism case studies
 - _ Concept of Peace Park and implementation in SA
 - _ Distribution of iron age habitation in Pafuri
 - _ Cons & livelihoods in Makandizulu, LNP
 - _ Madimbo Corridor land claim
 - _ Private game farms and transboundary conservation.
 - _ Makuleke training project (BA Hons)
 - _ Gender and Indigenous Knowledge in LNP (Hons)

2005-2006

- _ Workshop: "Engaging conservation practitioners and local people" (2005) - post-Indaba process
- _ Workshop: "Tourism in the GLTFCA" (2005) – post workshop process Social sustainability of PAs/ TBPAs conference – being developed (2006?)

Dissemination

- _ Academic Journals, Non-academic journals, Afrika-sued: ISSA, NSE – Netherlands, African Wildlife - South Africa, IUCN publications, Frame, Teleseminars

Issues

- 'No big idea enter this world without a curse' - Sophocles
- Colonial history of the social sciences and critique
- Critique and criticism
- Critique for critique's sake: post-modernism
- Engagement: conservation as worthy objective
- Social science only as management tool
- Analytical interventions for equitable and socially sustainable conservation outcomes

Participants expressed their appreciation for the presentation. Discussion on possible links between veterinary research and the sociological research being conducted by TPARI ensued.

6.5 Onderstepoort Veterinary Institute (Fred Potgieter)

The following main points were covered in a briefing by Fred Potgieter:

- OVI was a parastatal organisation where the main thrust is to develop technology for disease control – e.g. diagnostics, vaccines, use and application of new technologies
- All of the research and development proposals put forward for the next financial year have been funded
- OVI can offer surveillance, screening, diagnosis services, etc. for particular diseases
- The institute is customer driven and its prime responsibility is to help meet the disease control and disease management needs of the agricultural industry in South Africa.

Discussion:

Roy Bengis noted that landowners now legally “responsible” for disease and this created a need for the rapid detection of diseases as distinct from “certification” of the presence of a disease by a state veterinarian

6.6 Mozambique Diagnostic Laboratory (Rosa Costa)

Rosa Costa briefly outlined the work of her institute and their interest in participating in the AHEAD-GLTFCA programme. It was encouraging to learn that funds were likely to be available from the current World Bank project to facilitate their work and to establish a wildlife veterinary unit.

7. STRATEGIES/TACTICS/PRIORITIES FOR DEVELOPING THE AHEAD-GLTFCA PROGRAMME (Facilitated discussion)

The discussion was initiated with the following points presented on slides *[editorial note: I have updated some of the slides as presented in these notes from the time they were presented at the meeting: any errors of commission are my own. –Steve O.]*

Strategies/tactics/priorities

Consider:

1. Funding for the overall programme and its components
2. The science needed to move forward in a concerted / integrated way
3. Local support and buy-in (building interest & credibility)

The funding problem:

1. Wellcome questioned the science (livestock focus of Wellcome- livestock/wildlife interface not a concept they had been considering)
2. GEF asked about the relevance to biodiversity conservation (donor education an issue with something relatively new like this)
3. Development agencies (including GEF) – see too much emphasis on research (in the face of development needs)

So, how do we deal with the funding problem?

1. Define the conceptual framework more rigorously
2. Identify key modules/projects – those that are likely to result in maximum leverage
3. Target potential donors more carefully (hard when relatively few donors are focusing on conservation)
4. Park modules/programme components under different programmes while maintaining linkages & coherence

Draw in related programmes and partners (part of ongoing process):

1. Programmes in SA?
RESTORE, OVI, OP, PPF
2. Programmes in Zw?
WWF – CBNRM, CIRAD, CESVI
3. Programmes in Mz?
WB, GEF,

➔ Need good, up to date information on existing programs to build Synergies and Bridges and win-win partnerships

Discussion: The ensuing discussion covered potential approaches to several donors including NEPAD. It was, however, clear that Aid/Donor agencies would want to see a greater emphasis on developmental aspects, poverty alleviation and conservation action. The key research components would be best pursued through competitive research proposals for project funding submitted through Universities. AHEAD (Animal Health for the Environment And Development) is not just about research. Especially with donor community, need to emphasize applied problem-solving, real world applications to improve livelihoods, health and environmental stewardship.

8. NEXT STEPS, ACTIONS AND RESPONSIBILITIES

1. The record of the interim meeting would be written up by David Cumming and circulated.
2. The write-up of the Framework meeting would be completed by David Cumming and Harry Biggs early in the New Year and David Cumming would be continuing work on the Conceptual Framework early in 2006.
3. Some aspects of the AHEAD programme would be presented at the Resilience Alliance / Complex Adaptive Systems meeting and symposium that is being planned for April, 2006.
4. Potential linkages between PPF and WCS would continue to be explored.
5. Other work recently funded (e.g., scenarios planning with USAID and Sand County Foundation support) to get underway.

9. THANKS AND CLOSURE

Thanks were extended to SANParks for hosting the meeting and particularly to Danie Pienaar and Piet Theron for their help in arranging the meeting to follow-on from the JMB meeting on research policy for the GLNP and TFCA earlier in the week.

10. NEXT MEETING

The next Working Group Meeting is expected to take place between the 8th and 10th of March 2006. It will probably be held in or near Pretoria and further information on the meeting will be sent out in January.

APPENDICES

APPENDIX #1: LIST OF PARTICIPANTS

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APPENDIX #2: DRAFT AGENDA

Wednesday 19th October

- 14.00 Welcome and introductions** (Chair - Danie Pienaar)
- 14.15 Record of 5th Meeting (February 2005) and review of progress on concepts and project development** (Facilitated by David Cumming/Mike Kock)
(USAID grant to WCS, GEF, CASS and SCF on scenario planning and others?)
- 15.30 Tea/Coffee**
- 16.00 Report back on Framework meeting held in May 2005 and discussion on conceptual frameworks** (Harry Biggs & David Cumming)
- 17.30 Break for evening**
- 1900 Boma Dinner**

Thursday 20th October

- 08.00 Related research developments and linkages** (World Bank programme in Mozambique, PPF Veterinary Programme, SANParks, TPARI, and others)
- 09.30 Letters of Understanding and institutional commitments**
- 10.00 Follow up on GEF proposal**
- 10.15 Tea/Coffee**
- 10.45 Strategies/tactics/priorities for developing the AHEAD-GLTFCA programme**
(Facilitated discussion)
- 12.15 Summary - next steps, actions and responsibilities**
- 12.30 Thanks and closure**
- 12.45 Lunch and departures**

APPENDIX #3: DRAFT PROJECTS SUMMARY TABLE + UPDATES IN OCTOBER, 2005

AHEAD-GLTFCA – Programme: Outline of Themes and Modules and summary of concepts being developed or suggested – 20th October, 2005 draft

Theme	Module	Potential research proposal/Activity	Lead Agency/ person respon.	Status	Potential Donor
#1 Overarching conceptual framework to facilitate integrated and inter-disciplinary approaches	a) Coordination and project start up	1. Support for the coordination and development of the AHEAD-GLTFCA programme	WCS/ Osofsky	Outline proposals developed	WCS
	b) Development of inter-disciplinary frameworks and models	1. Develop conceptual models to link the six programme themes through a series of meetings/workshops involving full range of researchers/disciplines and stakeholders in the GLTFCA (Start with a model asap – one day session of a few people?)	WCS/CASS Cumming	Initial funding secured for framework and scenario planning	USAID/WCS
		2. Furthering TFCA scholarship (open for further discussion) ? NSF grants, Ford Foundation support to MSc. Students., UCN/PLAAS short course. TPARI. Scholarship funding? Pick up on baseline indicators	CASS Inst. Nat. Res. Centre Environ. & Development.	Initial note from CASS	
	c) Baseline indicators	1. Participatory surveys of animal and human diseases, livelihoods and socio-economic baseline data in communal areas of the GLTFCA (Part of module 1(a)1?)	WCS Cumming/Osofsky	Initial concept and budget by WCS	GEF?
#2 Animal health and disease	a) Epidemiological studies	1. BTb, FMD and Brucellosis in Sengwe Communal Land Zw.	Vet Wildl. Unit, Zw/ Fogglin	2000 cattle sampled – non +ve	PPF
		2. Status of BTb, FMD and Brucellosis in Limpopo National Park Will be done this year	DINAP/Pereira and Raath	Initial note	PPF
		Kruger			
		3. Serological studies of FMD, etc. in wild and domestic ungulates in the GLTFCA (Links to Theme #4 need to be built in and be explicit + link to a development NGO?)	OVI Vosloo et al. Will be revisited	Project concept	
		4. BTb and zoonotic implications	OVI / Michel	Project Concept Needs further development	
		5. Coordinating pathological data/sample analyses in GIS database	Lane	Project Proposal developed	
		6. Monitoring of tsetse in TFCA	Potgieter	Follow up with EU (v.d. Bosche) on monitoring in GLTFCA	?EU
		7. BTb data base from MRI work	MRI / Wayne Getz / Claire Geoghegan	Programme continuing	? UCB
	b) Alternative animal health management and disease control strategies	NOTE: No concepts yet Primary health care measures, Cultural practices and indigenous knowledge, links with epidemiological studies, community based strategies			
	c) Preventative/proactive measures in disease control and management	7. SOPs/Contingency plans/Risk assessments/Scenarios for priority diseases (e.g. Distemper) as a way of helping to define research and management priorities. (?Alien invasions!) – links to National Depts., Joint MB – Vet & Wildl. Committee	Raath Starting with baseline GIS work and developing a template		

Theme	Module	Potential research proposal/Activity	Lead Agency/ person respon.	Status	Potential Donor
	d) Theoretical/fundamental studies (Needs further development in terms of key or strategic additional studies/ideas)	1. Examining the relationship between social structure and the spread of diseases in ungulates and viverrids using modeling approaches and empirical data from general sampling of disease presence in a range of species in these groups. (also question of Brucella in small ungulates)	?	Initial note- Cross can not continue (new job)	NSF
		2. Spatial models of disease risk between KNP and Mozambique using village livestock and wildlife densities and also examining the risks of diseases spreading from dogs to wild carnivores	?	Initial note- Cross cannot continue (new job)	NSF
		3. Study of tick-host-pathogen ecology at several spatial and temporal scales involving wild and domestic ungulates and humans. A key area of focus would be on determining thresholds of transmission and how these may vary under differing management regimes.	Cumming GS WEC/UFL	Initial note	
#3 Landuse, ecosystem goods and services & animal health	a) Spatial and temporal relationships between ecosystem processes and disease prevalence	NOTE: No concepts yet Requires remote sensing studies linked to epidemiological work in Theme #2 Climate change and cycles in relation to disease spread and prevalence			
	b) Landscape level resource use and impacts by wild and domestic ungulates on ecosystem goods & services	NOTE: No concepts yet Requires remote sensing studies and detailed ground survey work at appropriate scales e.g. impacts of elephant damage, overgrazing, trampling on run off, nutrients, water, non timber forest products	INR?		
	c) Effects of landuse scale and pattern on animal health	NOTE: No concepts yet Requires links between 3a & b and 2a. <i>What minimum sets of data are needed?</i>			
	d) Linkages between animal and human health	1. Disease risk assessment of people living in villages in the TFCA	Follow up on LNP Survey by Raath and Pereira	?	
		2. What happens when fences are taken down in the wake of dispersal of wildlife from NP and vice versa for livestock dispersal (also linked to water distribution)?			
		3. Public health implications of establishing the GLTFCA	Simpson	Proposal	
	e) Understanding animal husbandry practices	1. Role of livestock in household production, community differentiation, collective management and institutional factors affecting these	INR	Being reworked	
		2. Mike's concept + ARC projects and related projects			
#4 Human livelihoods, animal health and ecosystem	a) Scenario planning and participatory exploration of land use options	1. Scenario planning and modeling at local community and village levels and developing approaches and methodology for "local adaptive scenario planning" – a 5 yr programme at least.	CASS + INR Mugabe & Murphree MJ +MW	Partially funded + Full Proposal being developed	USAID / WCS & SCF IDRC

Theme	Module	Potential research proposal/Activity	Lead Agency/ person respon.	Status	Potential Donor
ecosystem goods & services (Ecosystem health)		2. Issues of larger scale landuse planning, placement/removal of fences etc. (Biosphere Reserve concept for SEL of Zimbabwe?) (Need for spatial info. and remote sensing data/interpretation)	WWF-SARPO R. du Toit +CIRAD/NPWMA	Feasibility study in May 05 – Done. Extended TFCA concept now being examined	
	b) trade offs between alternative landuse enterprises	NOTE: No concepts yet but could form part 4(a)2 above on biosphere reserve concept			
	c) Effects of alternative policies on development, adaptability and resilience	NOTE: No concepts yet			
#5 Policy support and capacity building	a) Support for policy development on animal health and linkages between animal and human health and ecosystems	Reviews of existing policy, seminars and training workshops in policy analysis	?	Initial concept and budget developed by WCS	
	b) Exploring consequences of alternative policies using scenarios	See 5(a)1 above Scenario planning workshops Urgent need in Zw – scenarios and use of scenes from remote sensing	INR Mike Murphree RdT and MM		
	c) Capacity building in policy analysis	See 5(a)1 above			
#6 Communications and outreach	a) Communication between research workers and agencies engaged in the programme	Series of workshops and seminars	WCS (See also Theme #1)	Concept and budget developed	Partial support under USAID / WCS grant
	b) Information flow between scientists and Govt. and implementing agencies and policy making agencies	Workshops and seminars and meetings Development of website and database for results.	WCS & CASS PPF GIS initiative		
	c) Participation of landowners, communal farmers etc. in the programme & information flow	NOTE: No specific concepts yet			
	d) Production and distribution of research results, syntheses, policy briefs, etc	NOTE: No specific concepts yet			
	e) Community and Village outreach including theatre linked to PRA	Transfer of information and research findings to communities and feedback on their views, perceptions and needs	Kock & Theatre for Africa + INR	Concept note	

AHEAD-GLTFCA WORKING GROUP – 6TH MEETING

Record of the 6th Meeting held on the 9th – 10th March, 2006

Pestana Kruger Lodge, Malelane, South Africa

1. OPENING REMARKS AND WELCOME

The meeting opened at 09:00 hrs in the conference room at the Pestana Kruger Lodge with Dr. Danie Pienaar as Chair. He noted the importance of widening the range of disciplines involved in the programme and was pleased to see that participants from the medical, social and developmental sciences were at the meeting and would be making presentations.

Dr Carlos Pereira, (Carlos Lopes Pereira LMV, MSc. Unidade de Epidemiologia Veterinária, Departamento de Sanidade Animal, Direcção Nacional de Pecuária, Ministério da Agricultura e Desenvolvimento Rural, Moçambique), welcomed members of the Working Group to the 6th full Working Group Meeting and noted that the *AHEAD* concept, focusing on the interface between wildlife, livestock and human health, had come a long way over the last three years and there was greater awareness of the need for an integrated approach to animal and human health issues. There were nevertheless major challenges to be faced in conservation and development in the region. We are dealing with complex issues and processes that often produce surprising effects in response to our attempts to manage them. Both veterinary and medical perspectives were too narrow on their own. There is a need to consider the full range of variables involved and a failure to take a broad, integrated approach could all too easily result in inappropriate or incorrect decisions being taken. This was particularly likely to occur unless human-social factors in animal disease management and control were considered and understood. As a result, he particularly welcomed the *AHEAD* approach, and the input of social scientists and human medical health experts in the programme over the next two days – it was important to continue to widen our understanding of the system and to continue to develop a fully multidisciplinary programme. Dr Pereira thanked the organizers of the 6th Working Group Meeting and wished everyone an enjoyable and productive meeting.

The opening and welcome was followed by each of the 40 participants briefly introducing themselves.

2. INTRODUCTION AND BACKGROUND TO *AHEAD* (Steve Osofsky & Mike Kock)

Steve Osofsky, WCS Senior Policy Advisor for Wildlife Health, briefly reviewed the history of the *Animal Health for the Environment And Development (AHEAD)* initiative since its inception at the World Parks Congress in September 2003:

“The Animal Health for the Environment And Development (AHEAD) initiative was launched at the World Parks Congress in September 2003. Many of you were involved, and many individuals and institutions have come on board since. Groups such as the IUCN Southern Africa Sustainable Use Specialist Group (SASUSG), Veterinary Specialist Group (VSG), AU-IBAR and others worked with WCS to co-organize that initial forum. Much of the material generated at the Durban meeting and since is available at www.wcs-ahead.org, including video of all formal talks and copies of all slide presentations given at the launch. Approx. 80 participants in Durban (veterinarians, ecologists, economists, wildlife managers and other experts from Botswana, Kenya, Malawi, Mozambique, Namibia, South Africa, Tanzania, Uganda, Zambia, Zimbabwe, France, the United States, and the United Kingdom) worked together to delineate landscapes of conservation priority across southern and East Africa with significant disease issues at the wildlife/livestock/human interface. To make a long story short, the Great Limpopo TFCA emerged among the group’s highest priorities. The hope is that progress can be made in the GLTFCA through international and interdisciplinary collaboration, and that a successful applied research, development, policy, and outreach effort here could also potentially serve as a useful model for other places facing similar challenges in southern and East Africa, and potentially elsewhere. Just the fact that the AHEAD launch was able to be held at the World Parks Congress was significant. ‘Our’ issues have often not had a seat at the conservation table, and the significant sponsorship we received from agencies such as the US National Science Foundation (NSF), USAID, and others at a major event like the IUCN

World Parks Congress certainly helped raise awareness about the importance of animal and human health sciences to conservation success.

We wanted to utilize this unique opportunity at the World Parks Congress to address problems facing the regions' largest intact conservation areas, so we tried to focus the forum largely on the growing list of transfrontier conservation areas being developed in East and southern Africa, of which there are 20 or so envisioned to eventually encompass approximately 120 million hectares. These are large landscapes, many of which are grappling with health-related challenges to their success. The GLTFCA really is a fantastic model for addressing the types of challenges these TFCAs face in terms of disease issues and potential impacts on various sectors. As all of you know, there is no formal policy within SADC, for example, in terms of how to approach disease-related challenges at the livestock/wildlife interface in the context of TFCAs. Again, perhaps the work you are all here to continue to flesh-out could eventually inform such policy, another selling point, in my mind, for what we are all trying to do together: the AHEAD-GLTFCA programme is well placed to provide a model that could potentially be extended to other areas. And there has already been some interest in extending the AHEAD concept within the region. A workshop, facilitated by David Cumming and Mike Kock, was held in Namibia in November last year at the invitation of the Ministry of Environment and Tourism (MET). This workshop served to bring wildlife scientists and managers and colleagues from the agriculture sector together to discuss common issues, and to collaboratively look at approaches to disease control and management in Namibia. There is also the potential for AHEAD involvement in the KAZA TFCA.

There has been a lot of progress in the past year- for any of you who did not receive the new AHEAD book, the Proceedings from Durban entitled **Conservation and Development Interventions at the Wildlife/Livestock Interface: Implications for Wildlife, Livestock and Human Health**, I've brought some to this meeting- free for the asking. Many of you of course authored chapters in this volume, which seems to have been quite well received. We've also been able to raise awareness about the health-conservation linkages through a variety of other media- including a chapter in IUCN's new book on protected areas- both the AHEAD book and the chapter from IUCN Chief Scientist Jeff McNeely's Protected Areas book are available as free downloads on the AHEAD website. Those bold enough to do so can even purchase hard copies from IUCN! WCS and AHEAD make no money from the sale of the book- we just want to get the information into the hands of people who can use it.

We have also started to see some funding flow this year. As you'll be involved in over the next few days, support from USAID and the Sand County Foundation are helping us to proceed with the complex systems analytic framework effort as led by David Cumming and Harry Biggs, as well as the 'scenarios' module as led by Michael Murphree. These two efforts can be important foundations for the AHEAD GLTFCA initiative to enter what we hope will be an increasingly active and interactive phase in the region. And CASS appears to be on the verge of a significant funding success for scenarios and community work, which we will be hearing more about from Jeanette. The World Bank TFCA programme in Mozambique is also likely to provide support to help establish a wildlife veterinary unit in Mozambique, and to support some of the other work associated with disease issues in the Mozambique component of the GLTFCA.

I thought I'd put up the homepage of the AHEAD website for those of you who don't review it each night before you go to bed like I do. I also wanted to briefly describe what the Wildlife Conservation Society is for those who are not familiar with us. WCS is a not-for-profit US-based wildlife conservation organization with programs in over 50 countries. Our role in AHEAD has been and continues to be primarily that of catalyst, to help support meetings like this so regional colleagues can more easily share information and work together. WCS is also happy to support the coordinating role David Cumming was asked to take on by the Great Limpopo group initially assembled in Durban in Sept. 2003.

For those of you who don't have it (very few of you, I would hope), we've printed a few extra hard copies of the working draft of the concept paper, 'Sustaining animal health and ecosystem services in large landscapes – 2nd Draft – Concept for a programme to address wildlife, livestock and related human and ecosystem health issues in the Greater Limpopo Transfrontier Conservation Area.' We also have copies of the notes from our previous full Working Group meeting in Pretoria in February of last year, as well as an overview from the May 2005 'Frameworking' meeting and notes from the October 2005 interim meeting, both held at Skukuza. Of course materials generated from previous meetings are all made freely available on the AHEAD website.

I just want to conclude with a couple of personal thoughts on the AHEAD GLTFCA initiative at this point. I am only speaking for myself here- not for AHEAD as an initiative or anyone else. First, I think you- the members of the Working Group- need to actively decide whether the balance between research and applied work as

currently envisioned is where it needs to be. As conceived in Durban, AHEAD was never meant to be a research initiative per se- but much more than that. Policy engagement, technical assistance to managers, development-oriented activities, even science-based advocacy- a whole toolbox of activities is certainly possible given the incredible breadth and depth of professional and institutional expertise the AHEAD GLTFCA Working Group represents. Sound science will of course need to underpin whatever activities are undertaken, but my point is that AHEAD itself should likely continue to be seen as fostering an enabling environment for a range of activities related to conservation and wildlife, domestic animal, human, and ecological health that are needed to ensure that the GLTFCA is a successful and sustainable endeavor.

Second, I think we need to constantly ask ourselves if the work we are all doing, including the research we are undertaking, is moving fast enough to inform decisions that are being made on the ground in real time. I realize that I am a characteristically impatient American, and that there is a lot happening at various levels that we cannot necessarily influence- but what I am getting at is that it remains important for us to try and make sure that the science we have at our disposal informs, whenever possible, decisions related to fences coming down or going up, to vaccination programs, to wildlife being translocated, to cattle being moved, etc. And I of course recognize the critical role of the Conservation and Veterinary Subcommittee of the Joint Management Board, of which several of you are key members, in this regard. Again, my personal perspective is that AHEAD is about influencing such activities and related land-use decisions for the better- and timing is often a real issue, I think.

That's all I wanted to say. Thanks very much again to all of you for making the time to come and participate in what I believe will be a very productive few days, and to Merle Whyte and Jackey Deacon, our meeting coordinators, for helping to pull it all together and making logistics so easy. Thanks."

Dr. Mike Kock, WCS Field Veterinary Program, emphasized that the AHEAD programme was a cross-cutting, multi-disciplinary effort that was operating in various areas around the world, including Mongolia and East Africa. However, the other projects were not operating at the ambitious level of the AHEAD-GLTFCA programme. The workshop in Namibia in November last year had been very successful in a country where agriculture veterinarians and wildlife experts seldom sat down in the same room. The KAZA TFCA programme has also been interested in the concepts being developed in the AHEAD-GLTFCA programme. Many of the problems (e.g. bovine tuberculosis and HIV) facing the GLTFCA were being faced elsewhere, particularly in East Africa, and the dissemination of ideas from the AHEAD programme was taking place.

NOTE: Most of the PowerPoint from the following presentations are available in PDF format on the AHEAD website at http://www.wcs-ahead.org/gltfca_march2006/agenda_march2006.html

3. COMPLEX SYSTEMS, CONCEPTUAL FRAMEWORKS & SCENARIOS

(Facilitator – David Cumming)

Previous Working Group Meetings were mostly concerned with programme design, institutional arrangements and funding issues. The agenda for the current Working Group meeting was designed specifically to bring a greater focus on the scientific aspects of the AHEAD-GLTFCA programme. The result is that a number of people were asked to make presentations that would provide a basis for wider and deeper discussion of the science involved in a wide range of disciplines in the programme. Speakers have been asked to limit their talks to about 20 minutes so as to allow ample time for discussion. The initial session will be concerned with wider issues of dealing with complex systems, conceptual frameworks and scenario planning followed this afternoon and tomorrow morning by more specific presentations on a wider range of disciplines.

3.1 An Introduction to Complex Systems Thinking and Research – Complexity 101

Harry Biggs

This is the abstract for an introductory talk on complexity, first presented in July 2005 by Harry Biggs at the 40th annual congress of the Grassland Society of southern Africa

Complexity theory has made a serious debut in resource management and ecology in the last decade. This is presumably a response to poor performance of existing paradigms, in the face of the increasing desire to try to see systems in their socio-ecological entirety.

Complicatedness is not the same concept – a jet aircraft or a microchip is complicated, and unless broken, delivers deterministic outcomes. Complex systems, ironically, often depend on only a few (usually three to five) main drivers, the essence of the complexity lying in the varying role of these drivers and their interrelationships. A savanna ecosystem (even before human socio-economy is factored in) is classically complex, with rainfall, herbivory, fire, and other drivers playing a tantalizing quasi-predictable game which is ever changing. Different combinations can lead to the same outcome; under other circumstances relatively small differences at the right time lead to major system state shifts, indicating a non-linearity in many responses. This complexity is further characterized by serious scale effects, including between-scale issues, which if construed as a hierarchy can be dealt with. Time lags also need to be taken into account. Feedbacks (strengthening a ‘vicious circle’ or counterbalancing it) are a standard feature, causing behaviour difficult to predict, and making scenarios of trajectories a more realistic tool than the predictions ‘normal’ science was meant to but cannot deliver.

Interactions between drivers compound in various ways to produce so-called emergent properties, making the system *adaptive and self-organising*. It now appears that ecologists and range managers have long appreciated, albeit tacitly, these qualities in complex adaptive systems and have in fact not been overwhelmed by this dynamism (change over time) and heterogeneity (patchiness over space). It may be time to formalize these concepts into our body of knowledge and so confront holism.

Today we see ourselves as involved in systems with not only biophysical but also social and economic drivers, and may thus benefit from considering the construct of the socio-ecological system (SES) which, because of human learning, could or should be particularly adaptive. This is based on resilience principles and the associated notion of alternate stable states as espoused in range management in recent decades. These states are analogous to cups (domains of attraction) and are reached when drivers force the “ball” over a ridge (or threshold). Today the notion has been expanded from the way most of us got to know it (say grassland cf. woodland cf. shrubland) to a wider formulation linking all drivers into one unified system. Such a unified model explores, through delivery of ecosystem services, the effect of ecosystem change on human livelihoods and, through human incentives and activities, their impact on ecosystems. The SES attempts to couple these (using the complexity principles above) into just one system, and through scenarios, to prepare us for a possible range of outcomes and responses. It turns out that southern Africa offers some of the best opportunities in understanding and using SES methodology, including a wide range of contrasts to test understanding of how systems function and what triggers their change.

Discussion:

1. *Chaos theory and complexity?* ‘Chaos theory’ is a branch of a wider mathematical theory of non-linear systems or dynamical systems theory. Chaotic systems can display deeper levels of patterned order and structure that is nevertheless not subject to precise prediction. Similarly complex systems often display cycles and feedback with the result that quite small changes can result in very large effects. The ‘butterfly effect’ being an often used example. Social-Ecological systems (SES) are considered to be complex adaptive systems and equilibrated (balance of nature) paradigms, still widely used to guide development and resource management policy, seldom apply to the real world of complex systems. Disease dynamics with thresholds and non-linear behaviour provide clear example where complex systems approaches are appropriate and where such aspects as spatial patchiness (e.g. in land uses), fences and control methods may interact in unpredictable ways.
2. *Diseases as responders and drivers.* Disease can respond to environmental or social condition, or both, but can also act as drivers of large-scale change. The rinderpest outbreak of the 1890s is a

clear example of an animal disease resulting in macro-scale effects. The "Spanish" flu pandemic of 1918 was another example and the current spread of avian flu has already had major effects in terms of mobilizing global attempts to contain its spread. Issues of spatial and temporal scales are important in these dynamics as are cross-scale effects (e.g. development interventions in Ghana may fail because they come at the wrong time, and a veld fire may be best managed by going home to think about it before rushing in to fight it).

3. *Managers and scientists.* One of the tensions between scientists and managers arises from the fact that scientists abhor Type 1 errors (i.e. accepting results that may be false) which can lead to delays in obtaining suitable evidence or making recommendations. Whereas in managing resources it is often more important (precautionary) to avoid Type 2 errors (i.e. rejecting a result that may be correct). Managers lower their tolerance threshold for error and, depending on the importance of the issue, are more ready to take risks because they have to get on with the job. The most effective way around the problem is to adopt overlapping and varying strategies at different levels of risk – keep good science, avoid being “too obsessed with getting it right” and learn to manage for change.
4. *Disease and drivers of ecosystem dynamics.* It helps to think of pathogens as part of the food web and the complex interactions that normally accompany food web linkages and dynamics and what else is going on in the ecosystem. Sometimes these interactions dominate; at other times abiotic factors such as the weather (e.g. droughts) can dominate. It is impossible to measure everything and key drivers, variables and scales need to be identified.
5. The importance of values and their role in driving political and resource management decisions cannot be neglected. Values also change with time.
6. There is a need to bridge the gap between “Command and Control” and adaptive approaches to managing diseases and ecosystems and equally to deal with the issue of how institutions and their design may or may not match, or be able to deal with, complexity.
7. The knock-on effects of diseases on tourism need to be examined.

3.2 Developing Conceptual Frameworks, Models and Linkages between Themes and Modules for the AHEAD-GLTFCA Programme

David Cumming

The development of conceptual frameworks and models for the programme since its initial conception at the World Parks Congress (WPC) in September 2003 will be presented together with some additional models and frameworks that may be useful to the programme. The extent to which frameworks and conceptual models developed so far are useful in bridging disciplines within the programme needs to be critically examined.

The initial concept for the programme, outlined at the WPC, focused on disease in relation to wildlife-livestock-human health. The spatial boundaries of the GLTFCA (as opposed to the GLTNP) were ill defined but broadly included the Limpopo, Banhine and Zinave national parks and intervening areas in Mozambique, Gonarezhou NP, conservancies and some communal land areas in Zimbabwe, and Kruger NP and adjacent conservancies in South Africa. The western boundaries in both Zimbabwe and South Africa remain undefined. In Zimbabwe it may eventually extend westwards to link up with the Shashe-Limpopo TFCA.

By November 2005, at the first meeting of some members of the Working Group in Pretoria, an “ecosystem health” component had been explicitly added to the animal and human health components. The ecosystem health component included issues of land use and participatory research into landuse-disease issues. A key factor in the debate, at least in Zimbabwe, is the siting of FMD control fences and their impacts on landuse options – particularly wildlife and tourism and livestock marketing. These issues were seen as being intimately linked to national landuse and disease control strategies, thus adding an explicit policy dimension to the programme.

The broader conceptual framework outlined in “*Sustaining animal health and ecosystem goods and services in large landscapes*” (Cumming 2004 http://www.wcs-ahead.org/workinggrps_limpopo.html) has formed the basis of planning programme development, funding and the growth of the interdisciplinary nature of the Working Group over four meetings. Basically, the current programme comprises 6 themes. The core research themes are, (i) Animal health and disease (Theme #2), (ii) Land use, ecosystem goods and services (Theme #3), and (iii) Human livelihoods and animal and ecosystem health (Theme #4). The remaining three supporting themes are: (i) conceptual frameworks and scenarios (Theme #1), (ii) Policy and capacity building (Theme #5) and (iii) Communications and outreach (Theme #6). Within each theme 3 to 6 modules, under which a number of project may fall, have been explicitly identified.

The question of developing a more explicit conceptual framework that might more effectively serve to link disciplines involved in the programme was the purpose of a small workshop held in Skukuza in May 2005. An overview of those deliberations is provided in Appendix 2 and at http://www.wcs-ahead.org/workinggrps_limpopo.html. The Skukuza workshop explored a variety of approaches, including the start of a resilience analysis, the Millennium Assessment approach to assessing ecosystem goods and services, and a preliminary exploration of a systems model of an agro-pastoral system in the GLTFCA. Further conceptual diagrams of the key linkages between diseases, animal health and human wellbeing were developed for each of the research themes. A “stakeholder map” was also drawn up at the workshop (See Appendix 2).

Time lines indicating the major shocks to the GLTFCA social-ecological system over the last 500 years together with an indication of the major drivers involved (Appendix 2, pages 2-3) provide an indication of the key role played by diseases at several stages. The overriding role of political drivers is of course also apparent.

Additional examples of frameworks and models that might be useful in the AHEAD-GLTFCA programme include: (i) the Resilience analysis framework (Walker et al 2002), (ii) the Sustainable Livelihoods framework (Ashley and Carney 1999, Carney 2002) and, (iii) several more specific models dealing with alternative landuse issues and tradeoffs developed within the SELCORE programme in south eastern Zimbabwe.

The main reason for developing conceptual frameworks is to provide a heuristic understanding of the system and to identify key issues and areas where we lack understanding and information - there is unlikely to be a single framework that will capture everything, so several models or frameworks are likely to be required. Another important role of more detailed models (such as that devised for the agro-pastoral system) is to help us understand how things affect each other and where are the areas that are not understood (what are the positive and negative drivers in the system). The link between the frameworks project and the scenarios will most likely be in looking at resilience under different scenarios – with more explicitly identified variables, thresholds, processes - to improve understanding and change our description of the system - and also to lead to improved policy.

References:

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- Carney, D. (2002) Sustainable livelihoods approaches: progress and possibilities for change. London: DFID, Department for International Development. 64 pp.
- Walker B, Carpenter S, Anderies J, Abel N, Cumming G, Janssen M, Lebel L, Norberg J, Peterson GD, Pritchard R. 2002. Resilience management in social–ecological systems: a working hypothesis for a participatory approach. *Conservation Ecology* 6(1):14. [online] URL: <http://www.consecol.org/vol6/iss1/art14>.

Discussion:

1. *Questions and frameworks.* Complex systems such as those we are dealing with cannot be viewed by a single framework and it is more sensible to start with the questions first and develop frameworks around the questions. However, the system needs to be described and defined at the same time as the formulation of questions and frameworks.

2. *Zoonoses.* Zoonoses cannot be lumped into a single package. Sixty percent of human diseases come from animals and 75% of newly emerging diseases are coming from animals – many of these are ~once-off events (e.g. HIV) after which the disease is transmitted between humans and can be regarded as “historically” zoonotic. Many other zoonotic diseases are not maintained in humans and required repeated infection – an extreme case is rabies. The key question is whether this is an accelerating process, is there sudden increase in emerging diseases or the incidence of zoonoses? Initial zoonoses occurred during domestication, but with increasing contact between people and wildlife and increasing movement of animals and products, changes are occurring.
3. *Central focus or central question of the programme?* ‘
 - a. David Cumming’s suggestion was “Do diseases behave differently over large landscapes? Or, do disease dynamics change with landscape fragmentation and under alternative landuse patterns?” The focus would be “large landscapes and disease dynamics.”
 - b. Gavin Thomson – Are landscape size and pattern important? Diseases can spread from a small source and have a huge impact – the initial event may not be linked to landscape size in which case the title of the programme is inappropriate. (But subsequent disease dynamics (i.e. after an initial event) may well be linked to size and pattern?)
 - c. Mike Kock – What is the impact of TFCA management on the health of the ecosystem? It is difficult to answer this question when we don’t even know what diseases are present in much of the TFCA.
4. *Values and science.* There is an underlying assumption driving the development of TFCAs, namely that larger areas under conservation will bring greater economic and other benefits than the existing systems of landuse. There is a need to bring scientific analysis to bear on the issues of the social, economic and environmental costs and benefits of alternative land uses. (See opening summary in the 2004 concept paper).
5. *Consequences of TFCA for animal, human and ecosystem health?* This question has implications well beyond the boundaries of the TFCA. There is the important corollary of the implications of animal health issues on the sustainability of the TFCA. When TFCAs were first developed disease issues were identified as a major potential constraint. An important associated question is “What is the systemic role of *disease management* in the GLTFCA?”
6. *Programmes and projects.* There is a need to distinguish between the programme and its constituent projects – people tend to focus too much on their own area of expertise and at a project level. Specific research questions are hung on each of the six Themes and their sub-questions. What we are searching for is the interdisciplinary linkages (conceptual framework) between these themes and their modules. Further work may be needed on some specific aspects in order to clarify overarching and more specific research questions.
7. *Political support.* While it is important to clarify research questions, the overall political support for the programme is equally important and could have a direct bearing on the extent to which research can influence policy, not only for the GLTFCA but also for the wider region and TFCA development in relation to animal disease issues.
8. *Viable projects.* Some projects within the programme are more viable than others and it is important to keep those going. There are still gaps in the social sciences and a need to develop models and multi-perspective approaches and ideas related to human health issues in particular. An alternative focus for the programme, as a one-liner, may be “Disease and TFCA sustainability.”

3.3 Introduction to Scenarios

Michael Murphree ((Adapted by Mike Murphree from Richards Bay Minerals Scenarios 2005 – 2015, Institute of Natural Resources April 2005.)

Scenario Planning has its early roots in post World War II military planning. It was taken up thereafter by Herman Kahn of the Rand Corporation and applied for business purposes. It was later developed into what is now known as decision scenarios by the Royal Dutch Shell group. The methodology was applied by Pierre Wack and his team to enable Shell to anticipate the oil shocks and crises in the 1970s. This was one of the reasons that Shell has become a leading oil company in the 21st century.

In the South African context the scenario methodology was used when Clem Sunter of the Anglo American group brought in Wack and others to help develop political and economic scenarios subsequently known as the High Road / Low Road scenarios. These scenarios fundamentally challenged the role of corporate business during the late *Apartheid* era.

There have since been many applications of Scenario Planning in various parts of the world, and there has been significant development, improvement and enrichment of the basic methodology to suit a variety of contexts.

It is important to note that Scenario Planning is not a forecasting tool, nor is it designed for prediction or optimisation. Rather the underlying philosophy is that the world is far too complex and subject to significant turbulence so as to prevent accurate forecasting except under very limiting conditions, controlled situations and only in the very short term. As a result the future is likely to be highly uncertain, subject to high levels of non-linear relationships and increasingly high levels of causal ambiguity.

Scenario planning is designed to surface and challenge current fundamental assumptions and mental models of decision making (default scenarios). When used by groups it helps develop a deep level of collective learning which results in understanding how the fundamental drivers in the environment could lead to future outcomes. This understanding then enables the decision making team to envisage how different futures (scenarios) may emerge with an appropriate level of confidence. It therefore provides them with an intellectual reconnaissance of the future and enables them to “rehearse the future” before the future arrives. Scenarios are a kind of future history. It enables one to make sense of the future in the same way that we use history to make sense of the past.

Scenarios are not merely a linear list of facts about the future. Scenarios are *narrative* accounts of the future that consider facts, but focus more on the deeper causal structures that are manifested in patterns, trends and events that give rise to the facts that we observe. In other words, scenarios address the inter-dependencies of key driving forces and underlying variables, and hence take into account non-linear relationships as well. Although a set of facts and trends may be useful, they quickly become dated and are often rendered meaningless when viewed in isolation from the deeper causal, structural relationships that drive them. More importantly however, when there are high levels of uncertainty and fast changing situations, the facts become somewhat obsolete. The narrative format of scenarios is important because it provides a framework for complex inter-relationships and dependencies that are not possible using, for example, a framework based on a set of simple equations. In complex environments subject to uncertainty and high levels of ambiguity, the scenario methodology and narrative framework are superior to forecasting and optimisation techniques, as they do not suffer from the extremely limiting restrictions of *ceteris paribus* (all other things being equal) assumptions.

Scenario Planning in AHEAD

There are two scenario planning processes operating in the AHEAD programme.

- Local level scenario planning, iterative assessment and adaptive management – this process is lead by CASS in collaboration with the INR this is a long term (five year) experimental process that will see the evaluation of scenario planning as a planning tool at the community

level. This process is being funded by the IDRC of Canada and indications are that this funding will be forthcoming.

- The second scenario planning exercise is linked to the first but at a more technical level and will work with the AHEAD partners in developing a set of scenarios in 2006. It will also feed into the methodologies to be applied to the longer-term programme. This process is being funded by USAID support to AHEAD and by the Sand County Foundation.

Approach

- Following the Pestana meeting a group of 15 – 20 AHEAD partners will meet (date and venue yet to be determined but most likely in June / July) to initiate the scenario planning process at the technical level. Several AHEAD partners have already indicated their interest in participating in this process. **Those who did not attend the Pestana meeting BUT are interested in participating in the process should contact Mike Murphree.**
- This meeting will also be used by those participating in the community level exercise to discuss methodologies and approaches. It will also be an opportunity to start identifying communities for participation in South Africa and Mozambique.
- In the interim those who will be participating in the process will be sent some ‘homework’ on scenario planning. And, in particular, participants will be asked to start considering a range of “key questions.”

Discussion:

1. *There are so many possible scenarios* – how do you decide which is best? The general rule is to not to go beyond four, often contrasting, scenarios which are narrative rather than quantitative and thus not confined to details but rather to possible and likely alternative futures. This meeting is largely a technical group and likely to develop alternative scenarios that are very different to those that might be developed by communities. The question is, how do communities see themselves? Corporate and military sectors have produced many scenarios and with a lot of their own jargon. We also need to adapt the technique for communities of local people - and to find ways of linking it with technical inputs.
2. *Where to start?* It may be best to start at the community level and then to scale up from there. At a technical level there are clear linkages with veterinary concerns and the development of disease risk assessments and strategic operational plans in the event of outbreaks. Such technical plans need to be linked to the realities of local social and economic realities. For example, in Ethiopia in 1981-82 when an outbreak of rinderpest occurred people fled with their livestock because they feared their animals would be slaughtered with the result that they spread the disease. A similar phenomenon occurred recently in relation to FMD control in Zululand. These examples, and others, suggest that it is desirable to examine scenarios beforehand, particularly with affected communities. However, the development of techniques and approaches to using scenario planning at a village level have still to be developed and tested.
3. *Time scales?* The question of time scales has not been addressed. For many changes, particularly those relating to policy changes the time scale may be 20 years or more. It may take 15-20 years to establish the validity of chosen scenarios and adaptive approaches and learning will be of paramount importance.
4. *Boundaries in time and space.* Scenarios cannot answer all the questions and need to be carefully bounded in time and space. Scenarios developed under the Millennium Assessment programme may not be particularly useful at a local level.
5. Members of the group who wished to participate in scenario planning workshops during the course of the next few months were asked to sign a sheet being circulated.

4. UPDATE OF CONCEPTS / PROPOSALS AND RELATED PRESENTATIONS

(Facilitator: David Cumming)

The group worked through the Summary Table of Themes, Modules and Concepts that was last updated at the Interim Meeting held at Skukuza in October, 2005. The updated version from this meeting is appended as ANNEX 1. Additional points and discussion not included in the table were as follows.

1. *Extension of BTB research programme.* The Berkeley BTB programme funded by NSF was for five years which ended in May 2005. A no cost extension has allowed it to go through to May 2006 but new funds are now needed to keep it going. PPF had undertaken to assist and Elissa Cameron, MRI Director, has taken responsibility for finding the necessary funding and has submitted a proposal and budget to PPF.
2. *Brucellosis.* Wayne Getz noted that a proposal has been submitted to NSF for work in Umfolozi but they will only hear the results of a very competitive bid in June.
3. *Spatial data.* Graeme Cumming pointed out that much of the research envisaged under required a great deal of spatial data with very precise records of such aspects as human and animal movements, tenure maps, land ownership and use. Much of the baseline work could be carried out by students.
4. *Animal management practices.* Development and government agencies tended to focus their attention on improving levels of animal production but there was need within the AHEAD-GLTFCA programme to focus on animal management practices that may contribute to reducing disease transmission (which are of course likely to also benefit production). There could be several traditional practices that contributed to inhibiting or exacerbating disease transmission between domestic animals and between wildlife and livestock. There was a need for the careful study and documentation of animal management practices at the household and village level within the TFCA.
5. *Communication.* In terms of communication and communication strategies, Tim Neary noted that the group loved their “acronyms”, which, together with a high level of jargon, tended to exclude others. The non-initiated needed hooks on which to hang ideas and much more thought needed to be given to how the programme was communicated to potential donors and to the general public where the material and terminology needed to be kept simple and straightforward.

Short presentations:

1. Local level scenario planning, iterative assessment and adaptive management – Jeanette Manjengwa.

The scenario planning project initially developed by Professor Marshall Murphree and discussed at previous AHEAD-GLTFCA meetings has now been fully funded by the International Development and Research Council (IDRC) of Canada. The initial proposal was reviewed by IDRC and revised in the light of extensive comments from reviewers. The project has been funded at the level of \$500,000 for a five-year period and is due to be implemented in the three countries within the GLTFCA, namely, Mozambique, South Africa and Zimbabwe. The Institute of Natural Resources (INR) at the University of Kwazulu-Natal will be the South African counterpart – a Mozambican has still to be identified. CASS has been involved in programmes of decentralization of natural resource management to local levels for over 20 years using participatory methodologies. An analysis of the record of community based natural resource management (CBNRM) is highly mixed with a few successes but many failures. The reasons for failure are many and complex and this project attempts to address some of these weakness and to develop scenario planning methodologies and approaches that can be adopted at a village level where natural resources are communally managed.

The principal objective of the project is to enhance the ability of local level natural resource managers to collectively manage and benefit from their natural resources through the methodology of scenario analysis. A specific objective is to improve the understanding of GLTFCA planners of the needs and aspirations of the resident populations and to ensure they are considered in all planning and implementation.

The methodology is a sequential process of:

Scenario modeling → implementation → self assessment → adaptation and iteration

Where scenario modeling involves incorporating community visions and aspirations that recognize complexities, constraints and the development of an action plan with input from technical/professional knowledge, and where self assessment depends on agreed criteria for comparing performance against expectations. This is in turn followed by an analysis of what went wrong or right, with appropriate adaptive changes to / revisions of the management plan.

2. An introduction into the methods and some very brief results of our integrated Assessment Techniques <<http://www.nrel.colostate.edu/what/africaprogram.html>>. James DeMartini

Most of our assessments use Michael Coughenour's Savanna model. The model has been used all over the world. In South Africa, there are applications for Kruger National Park and for the Vryburg region in the North-West Province. In East Africa, there are applications to the Serengeti National Park, Ngorongoro Conservation Area, southern Kajiado District, Kenya and an older application from Turkana. We won't have time to explain Savanna properly here, but I'll use a slide or two to introduce the model.

Slides (again, most of the PowerPoint from these presentations are available in PDF format on the AHEAD website at http://www.wcs-ahead.org/gltfca_march2006/agenda_march2006.html):

1. The flow chart of Savanna ...
2. PHEWS is a rule-based representation of Maasai household decision-making. Sequential steps are followed by households to meet their energy requirements.
3. Savanna has a weekly time-step, and results are summarized by months.
4. Savanna keeps track of biomass through time ...
5. And tracks spatial patterns as well. The area shown is Ngorongoro Conservation Area, Tanzania.
6. Savanna tracks herbivore populations through time, which are tied to their condition indices, and in turn tied to energy acquired.
7. And the locations of animals are tracked.
8. Examples of the types of analyses that can be conducted using SAVANNA.
9. A few examples of SAVANNA results
10. Here we looked at the effect of cultivation on wild and domestic ungulates, and on effects of human population growth. Cultivation in the NCA is now about 9,800 acres, which is a little less than 1% of the area defined for pastoral use, and about 0.5% of the entire area. We varied cultivation 0 to 50,000 acres, and looked at effects.
11. In general we could find no significant changes in wild or domestic ungulates in response to cultivation, even up to 5% of the area in agriculture. Didn't really make much difference and benefited the Maasai greatly.
12. By far the most ominous issue in NCA is human population growth. In about 1991 there were 35,000 people. By 2003 there were about 60,000. With relatively constant livestock populations that means people are living on fewer and fewer livestock – pastoralism is less and less central to their lives.
13. In Kajiado, we looked at the effects of isolating group ranches from the entire study area, and of smaller and smaller parcels. This area is in southern Kajiado, just north of Amboseli National Reserve (or national park, depending upon how lawyers decide the latest de-gazetting).
14. When analyses were done to compare sub-divided areas to intact ranches, results were interesting. Basically, changes in the number of livestock that could be supported when parcels were 196 km² were small (but enough to make Maasai less food secure). Changes when parcels were 1 km² were extreme. Eselenkei ... a 25% decline in livestock that could be supported! Olgulului ... a 20% decline.
15. Here, in NCA once again, we looked at the effects of reducing losses to East Coast Fever by 75%. In this analysis, livestock sales were disabled, to explore just the ecological

implications. Basically, the livestock do really well, but rangeland health declines, reflected here in a decline in palatable grasses.

16. With livestock sales enabled (PHEWS enabled), Maasai to sell extra animals (which adds to their cash box). Here, Maasai wealth increases (not shown), but the livestock populations stay more or less the same, and rangeland health remains good.

3. Malaria control in the Lubombo Spatial Development Initiative (LSDI) area.

Francois Maartens

A brief power point presentation showed the area covered by the LSDI and the various operational zones. The major recent focus was in Zones 1, 2 and 3 in Mozambique, much of it to the east of Kruger national Park and within the Limpopo National Park. The risk of malaria has been greatly reduced in the region from 250 to 20 cases per 1,000 people between 1938 and 2005. Results of the current campaign which started in 1999 also showed marked reductions in the incidence of malaria. This was an important factor for the tourism industry in the region. The major control method was spraying indoors with DDT and a key risk was the development of resistance in *Anopheles* mosquitoes. Resistance was carefully monitored and alternative insecticides were used for short periods if need be. DDT was, however, the most cost effective insecticide to use. The programme had a good GIS database with the positions of all houses treated and related information. Surveys are carried out before each spraying operation and local teams carry out the spraying.

5. CURRENT SCIENCE, DEVELOPMENT AND POLICY NEEDS IN THE GLTFCA

5.1 Animal Disease Threats and Priorities in the GLTFCA - a JMB Conservation and Veterinary Sub-Committee Perspective on 'Real World' Relationships between Management/Policy Decisions and Research – Roy Bengis, Markus Hofmeyr, Carlos Lopes Pereira and Chris Foggin. (*Representing the veterinary subcommittee of the GLTP JMB conservation management committee*)

Summary:

[Note: Much of the summary below is derived from notes from a recent meeting of the veterinary subcommittee of the GLTP JMB conservation management committee, and is not a transcription of actual discussions held within the 6th AHEAD GLTFCA WG meeting itself. –ed.]

Roy Bengis gave a brief discussion on the background and role of the veterinary subcommittee meeting in context with how it fits in with the Joint Management Board of the Greater Limpopo National Park and the most important disease issues being focused on:

GLTFCA JMB Veterinary Subcommittee and its mandate includes:

- The identification of potential animal health issues and challenges related to expansion of the geographic range of wildlife and their pathogens.
- Identification of potential conservation threats related to pathogens cycling in neighbouring livestock (in all 3 countries)
- Identification of the related human health and zoonotic issues
- Inclusion of these veterinary issues in the development of a Joint Management Plan for the GLTP
- To advise the Joint Management Board (JMB) on the management of animal health challenges, and prioritise appropriate activity areas to address these issues

Prioritisation of animal health challenges in the Great Limpopo Transfrontier Park:

A) Infrastructural needs:

- Centralised data base with GIS capability and data management system
- Communication network
- Technical equipment
- Diagnostic capability
- Training and capacity building
- Eastern Fence of the Limpopo National Park
- Development of a Wildlife Veterinary Unit in Mozambique

B) Disease surveillance and monitoring

1.) Bovine Tuberculosis (BTB) and Brucellosis:

- Monitor of BTB and *Brucella* status of cattle in the Sengwe corridor.
- Monitor of BTB and *Brucella* status of cattle in the Limpopo National Park
- Monitor of BTB and *Brucella* status of cattle on the KNP western boundary
- Monitor the BTB dynamics of the KNP buffalo herds.
- Buffalo translocations into Limpopo National Park

It was stressed that in the above surveys, funds must also be budgeted for compensation for positive animals that may be slaughtered. Some test-positive animals must be slaughtered to confirm the diagnosis and for TB strain fingerprinting.

2.) Tsetse flies and Nagana

- Monitoring of tsetse fly activity and spatio-temporal spread in Gonarezhou National Park.
- Monitor the northern KNP and LNP for tsetse fly incursion

3.) Anthrax and Rabies surveillance and monitoring

- Report acute death situations in herbivores (wild and domestic)
- Collection of blood smears (with field data sheet)
- Reporting of animals with abnormal behaviour (wild and domestic)

4) Topotyping of foot & mouth disease viruses in buffalo in Gonarezhou and Limpopo National Park.

- Collect blood and probang samples from a significant number of buffalo in Gonarezhou and Limpopo National Park

5.) Foreign animal disease surveillance in wildlife

E.g. Rinderpest, Canine distemper, High Path Avian Influenza

6.) Surveillance for wildlife-related diseases in livestock

E.g. Foot and mouth disease, Theileriosis, African swine fever, Trypanosomiasis and malignant catarrhal fever

C) Primary Animal Health Care at the interface

- Vaccination of cattle against FMD and anthrax
- Vaccination of dogs against rabies and canine distemper
- Deworming of dogs (including *Echinococcus*)
- Regular dipping and inspection of cattle herds

*A brief summary of the various relevant country disease issues:***Bovine Tuberculosis**

RSA - Markus Hofmeyr reported on the BTB and RVF survey carried out by SANParks. There was an approx. 4% increase in actual BTB found in the lethal survey conducted in the south of KNP after the culture results were received. The prevalence therefore for this sampling was 36 % (32% had macroscopic lesions) but this was importantly down from 38% in 1998. A random 10 % of herds were sampled. The rate of increase does seem to be slowing down, possibly as a result of good nutrition

and immunity? Many calves less than 6 months of age are infected, which is a concern indicating that young animals are now most susceptible to new infection. Few old animals were found, but those that were found were not infected. Additional infected lions and also warthog have been found. Further studies on the impact of the disease in lion on a population scale are required. This will become a focus of the future research in BTB in the KNP.

The Department of Animal Health will be looking at starting to use a Gamma-interferon test on cattle in the near future for general screening because of the difficulty of getting local communities to return to dip tanks 3 days later for TB skin test reading.

Future surveillance for BTB:

It has been confirmed that BTB has spread throughout the KNP after the diagnosis of a military case of BTB in a 4 year old buffalo bull in the Pafuri area of the KNP in 2005. There is a need to do prevalence studies in the North, but the question arises whether it is worth the financial costs of the exercise with the expected very low incidence. It may be crucial to look more carefully at the prevalence estimate at the KNP/Limpopo/Zimbabwe Park interface to better understand what level of BTB is currently at these country interfaces.

Chris Foggin had expressed a need to know what the number of buffalo in the area was, and to know what the number was that were crossing the Limpopo River annually. Concern was expressed at the lack of a coordinated action plan to deal with BTB in the sub-region.

Both Zimbabwe and Mozambique supported the idea of detailed sero-surveillance in the North of the GLTP. In the areas that are likely to be conflict/interface areas, this should be done every 3-5 years, but it is only necessary to do this every 5-7 years in other areas due to the slow spread of the disease. A detailed buffalo census needs to look at not only the population size, but also the age distribution of the animals.

Zimbabwe expressed the need to keep BTB out of Zimbabwe if at all possible, and fencing of the northern boundary of the Limpopo River will be considered.

It was noted that recommendations needed to be sent to the Veterinary services of each country emphasising that monitoring of cattle has to continue as there is currently no realistic way to stop the spread of the disease in buffalo. It was therefore identified that the best current risk mitigation action was to prevent the disease from spreading from buffalo to cattle. This should be the focus of BTB prevention in cattle in all interface areas of the GLTP.

There is a possibility that kudu and possibly warthog are becoming maintenance hosts of BTB, but this does not seem to be the case in other species such as cheetah or small mammals.

Mozambique supported the call by Zimbabwe to keep BTB out of cattle areas, and that a fence to prevent buffalo and cattle contact on the eastern boundary of the Limpopo River was necessary. A suggestion was made to conduct a study specifically in Biodiversity Corridors that have been identified on the eastern boundary of the Limpopo Park.

Zimbabwe & Mozambique: - no cases have been found in Zimbabwe and no further surveys have been conducted in Mozambique. There is a requirement for this however to better understand the risk in these countries, especially with BTB possibly about to enter these countries from Kruger with infected buffalo.

Brucellosis

RSA - The prevalence of brucellosis in buffalo in the KNP is about 25%, with some reproductive disorders. Massive swollen hocks have also been seen. The prevalence in adult breeding females is about 35%. There is some debate if this disease has entered an endemic stable cycle in buffalo in Kruger as the incidence has been at this level for 50 years.

Trypanosomiasis

Mozambique – Nothing reported in Gaza Province. The tsetse survey is continuing.

Zimbabwe - No reports, although it is probable that there are tsetse at the Save-Rundi rivers junction.

RSA - Nothing further to report except there is an increase of cattle, horse and dog disease in northern Kwa Zulu Natal, which is of concern. Nothing further to report from Kruger (no tryps present)

Anthrax

RSA - None has been reported in RSA. Markus Hofmeyr reported that the planned educational CD on anthrax detection and diagnosis from SANParks has not materialized yet. The number of rangers bringing in blood smears from investigation has decreased by 84%, which is a major concern. This has dropped from 600 annually to approximately 100. This is being addressed by the state vets in Kruger with a survey of the knowledge and understanding of rangers as well as training planned.

Mozambique - It is suspected in Gorongosa but could not be confirmed.

Zimbabwe - One severe outbreak was reported in Malilangwe, in the Save Conservancy and elsewhere in Zimbabwe in 2004. There was another outbreak amongst people and cattle in central Zimbabwe in 2005 with sporadic cases in the lowveld in wildlife (small numbers found). No resources are available for allocation to the problem areas, and it will not be possible to vaccinate in some of these areas in advance. Chris Foggin predicts that the problem will persist under the current chaos in Zimbabwe.

Rabies

RSA - Human cases have been reported in Venda and there is a large program to vaccinate dogs, and in the KNP 2 feral domestic dogs were destroyed that had confirmed rabies (same cases as reported in Oct 2005 meeting, when it was wrongfully presented that the dogs were negative for rabies).

Mozambique - In the Massingir region, dogs and people have been vaccinated. A problem has been identified with regard to the local word for rabies, and the negative impact this is having on the vaccination campaign with local people not wanting their dogs to be vaccinated. In the Nyassa region, 365 dogs have been shot, and 8-10 people have died.

Zimbabwe - In the Bubiana area, 3 packs of wild dogs have died possibly from rabies. Throughout Zimbabwe rabies is being found in domestic dogs, ongoing problem.

Distemper

RSA - This has been found in the N. Cape, and wild dogs have died from it. The wild dogs were probably infected by bat-eared foxes, and showed a pattern of slow intermittent mortality but the whole pack eventually disappeared after 6 weeks from the first death. This is the first confirmed case of distemper mortalities in free-range wild dogs in South Africa.

Foot and Mouth Disease

In *Zimbabwe*, this was found in the area south of the Chiredzi-Rundi River junction in cattle. Laboratory capacity in Zimbabwe is very bad at the moment. Testing procedures are being evaluated to differentiate vaccine response from active infection. The buffalo fence around Gonarezhou is being re-furbished. The re-establishment and redefining of the FMD zones is under consideration, which will take cognizance of the proposed Biosphere reserve. The estimated cost for this re-alignment will be in the region of US\$ 8 million. This may have some impact on the status of farming areas in adjacent SA and Botswana and needs to be followed up with the respective NAHD of each country.

Mozambique - Vaccine has been obtained from Botswana, but is not being used. This is unexplained.

RSA - The Letaba outbreak has been contained. The fence has been re-aligned. Serological sampling in the Limpopo province has proved difficult, but Mpumalanga seems to be more organized. Lack of resources and proper allocation of staff has resulted in a lot of the routine monitoring, especially the Limpopo Province, not taking place anymore, which is a real problem, along the western boundary of the KNP and will have implications for the GLTP if important disease issues are missed or not well understood. These areas need support from the GLTP veterinary program and this will be communicated to any potential donors for veterinary projects (including PPF).

The Foot and Mouth control zone has recently been realigned and there is discussion ongoing on how best to classify the different zones. More information on this will hopefully be available by the next meeting.

Theileriosis

RSA - Markus Hofmeyr reported that a real-time PCR test is being developed, as Corridor disease is becoming a problem. The Welgevonden experience has shown infection varying from low to highly pathogenic. With the rapid expansion of buffalo throughout SA (due to re-introductions) there has been an increasing incidence of diagnosis of *Theileria* in many areas of the country. Due to the difficulty in specific and sensitive diagnosis this is becoming a real problem where decisions on the future of buffalo movements have to be made by the Department of Animal Health.

In *Zimbabwe*, the transmission is cow to cow on occasion (January Disease), and there is no point controlling this.

Mozambique: Theileriosis caused a number of mortalities in cattle around Limpopo NP in 2005 and was associated with a group of buffalo that came from the northern part of Limpopo NP. The problem was greatest where buffalo and cattle physically mixed near water or on pastures. Some of the buffalo have been destroyed but some may still be present in the area. The cattle deaths have had a negative impact on the attitude of local communities towards the GLTP development.

Major human livelihood/livestock/wildlife interface issues:

Zimbabwe - cattle are not vaccinated against FMD by any aid/government agency, yet are subject to elephant damage, and are expected to put up with it. It appears as if there have been lots of promises made to local farmers, without any concrete signs of aid or assistance. Structures are in place, but no vaccines or drugs are forthcoming, particularly in the face of FMD, rabies, and brucellosis. People are losing interest. Anti-malarial therapy, HIV/ART therapy and transport are desperately required. Biggest disease problem has been anthrax in livestock, and malaria and TB/HIV in humans.

Mozambique – The situation is much the same as described for Zimbabwe. Some progress is required – there are 20 000 people and 10 000 cattle in the park. There may be some voluntary movements of people out of the area, but resistance to movement is increasing, and conflicts are becoming regular, particularly with elephant. Cases of Corridor Disease have been found.

Bovine TB is less of a problem than human TB at this stage, but can become an issue.

Trichinella may become an issue, particularly if eating infected uncooked crocodile meat.

There is a degree of separation between cattle and buffalo, and there is some debate how infected buffalo will impact on cattle. People do drink un-pasteurized milk, and there are cases of straggler buffalo joining with cattle in some areas. At all times, communication between veterinary and medical health authorities must be maintained.

It was agreed that Peace Parks Foundation needs to be informed that one of the most important support actions that can be initiated by the veterinary program of the transfrontier parks was to support human and animal health programs on the boundary of the conservation areas, as these structures are very under-funded and not functional in most areas adjacent to TFCA's.

Emerging diseases:

Avian Influenza:

Mozambique - 11 Rapid Reaction teams exist, one National, 10 Provincial. Funds are available from both the veterinary and medical sides. A joint workshop between medical and veterinary professions was held during Feb. Wildlife monitoring takes place in certain areas. Scenario planning exercises are currently being carried out, with a budget of US\$2 million available. Serology gets sent to Kenya, because if it is sent to RSA, then there are cost implications. There was concern that RSA is charging Mozambique for these tests.

Zimbabwe - A Notifiable Avian Influenza Task force is present, which meets every 2 weeks. Updates distributed by press release. Wetlands have been identified that are likely to be a risk, and serological determination of the status of the disease is possible in Zimbabwe. A recent outbreak in ostriches has found H5N2, but virus has not been isolated. Backyard chickens are a concern, particularly with the population's general status of HIV infection.

RSA – a summary of the status of South Africa was given, with a situation similar to that described in ostriches in Zimbabwe. The disease was controlled and eradicated in ostriches in the E Cape and W Cape provinces. A National Contingency Plan is available. Monitoring of specific wetland areas is currently happening, and surveillance of poultry establishments is extensive. Quarantine requirements for the import of all avian species have been stepped up considerably.

Classical Swine fever:

An update was given on the Classical Swine Fever situation in the E Cape and W Cape, and that a compartmentalization approach was going to be adopted to all internal movements and exports. The export of all pork products and live pigs are currently banned from South Africa. Tests will soon be conducted in warthog and bush pigs to determine their role in the pathogenesis of the disease. The outbreak in SA has not been brought under control yet.

Exports through Giriondo border gate in Kruger is becoming an issue, as there are no quarantine officials at the border post. The next veterinary subcommittee meeting was planned to coincide with the March JMB meeting to be held in Maputo.

Discussion:

1. *Breakdown in veterinary services.* Major problems have arisen within the GLTFCA when veterinary services have broken down, for example, during periods of civil war or economic declines. The problems are particularly acute when vaccination programmes break down, for example in the control of rabies. An associated problem is the re-allocation of resources to the latest crisis as is happening in the current bird flu scare.
2. *Lack of information.* The major challenge facing the GLTFCA in terms of disease management is the lack of information on the status of many diseases in Mozambique and Zimbabwe.

5.2 The Challenges of Getting Real Data on Bovine Tuberculosis; the Wildlife / Livestock / Human interface. Claire Geoghegan, Wayne Getz, & Mark Robertson

Disease ecology, health and conservation

In 1933, Aldo Leopold wrote;

'The role of disease in wildlife conservation has been radically underestimated'.

Yet, despite 70 years of scientific research and conservation planning, similar sentiments are found in present day literature, including the following statement:

'Conservation efforts worldwide are still being hampered because of a critical flaw in the overall approach: the failure to recognize the critical role that health plays in animal population dynamics, species survival and the follow-on impacts on the human condition.' (Kock, 2005)

Modern concerns regarding emerging zoonotic pathogens, including H5N1, Ebola, SARS and HIV, suggest it is necessary to address animal and human health issues on an international scale.

Awareness of health issues within the broader scientific community has spawned new approaches towards disease research; including the philosophies of 'One Medicine' or 'One Health' (Kock, 1996, Schelling *et al.*, 2005). These methods seek to link human and animal health research with

biodiversity parameters; a concept that is popularly referred to as 'Conservation Medicine' (Meffe, 1999). Therefore, when conducting research to investigate zoonotic pathogens that are transmitted between wildlife, domestic animals and humans, it is important to collect quantitative data in order to fully understand the infective routes of transmission.

Taylor *et al.* (2001) have reported that the proportion of pathogens that are considered to be zoonotic is ~75%, while pathogens that can move from livestock to wildlife (54%) and between humans and wildlife (44%) are considerable (Daszak *et al.*, 2000). This doubles the likelihood that if a pathogen can infect wildlife, it will cause an emerging human disease.

Pathogens, including viruses, prions, bacteria and helminths can infect a wide range of hosts, including humans, herbivores, carnivores and scavengers. However, the causes of infection are diverse and poorly understood. Recent publications have attempted to identify the drivers of emerging and re-emerging human pathogens (Woolhouse *et al.*, 2005). When ranked with respect to the number of associated pathogen species, changes in land use or agricultural practices, poor population health (HIV, malnutrition), pathogen evolution (increased virulence, drug resistance), failure of public health programmes and climate change are identified as the most significant factors for the spread of disease (Woolhouse *et al.*, 2005). Many of these drivers are the consequence of global changes in food systems and resource use and accordingly, affect the poorest and least influential regions. It is therefore vital that world health programmes aim to redress this imbalance and tackle the emergence and spread of disease from a holistic and multi-disciplinary perspective.

The role of tuberculosis on human health

Tuberculosis (TB) is an ancient disease with a global distribution. Over one-third of the human population is infected with the bacilli, which leads to 8 million newly diagnosed cases per annum (WHO, 2002). This results in over 3 million deaths per year, making TB the third highest killer of man (WHO, 2002). Recent estimates published by the World Health Organisation (WHO, 2005) indicate that TB incidence rates are highest in developing countries, which represent over 80% of the global disease burden. Sub-Saharan Africa has the highest concentration of cases with over 300 per 100,000 people, 3% of the world's active TB and consequently the third highest global cumulative case load (WHO, 2005). As an estimated 90% of Africans have been exposed to the TB bacilli, it is not surprising that the increase of infection in South Africa has been 10% per year since 1980 (WHO, 2002). However, given the correct daily treatment, TB is not only a preventable, but also a curable disease. However, this relies on the capacity and commitment of countries to provide reliable and widespread health care services.

The role of bovine tuberculosis in animal health

Although many animal species can carry a range of Mycobacteria, *M. bovis* (bovine tuberculosis, BTB) is frequently considered to be the most problematic for animal health. The chronic nature of BTB causes a reduction in animal productivity, which together with the increased mortality of infected animals can prevent trade and severely impact on the economic status of the livestock owner (Ayele *et al.*, 2004).

Bovine tuberculosis has a global distribution, and is considered to be an invasive species in many places, including Africa. It has a wide host range, infecting ruminants, predators, scavengers and small mammals, including threatened, endangered and commercially valuable species (Thoen *et al.*, 1995). Consequently, it is difficult to eradicate as the pathogen may remain in reservoir and spill-over hosts after the removal of sentinel and maintenance species (Ayele *et al.*, 2004).

Despite being listed as a Category B disease by the *Office International des Epizooties* (OIE), and as such requiring active surveillance and reporting for effective control, data on BTB from many developing countries is often not available. Investigations by Ayele *et al.* (2004) found little reported data from 43 African countries and none for the remaining states. In the same paper, data from South Africa 'estimated' a low sporadic general occurrence, while Mozambique and Zimbabwe both reported 'small occasion problems' in the mid 1990s. Therefore, the extent to which BTB may influence animal health is officially unknown throughout the region. However, reports from national park managers and private game reserves throughout southern Africa indicate that the spread of BTB

is one of the primary concerns for maintaining sustainable conservation in the region (Michel *et al.*, 2006).

Disease dynamics: How is BTB transmitted and what are the risks for public health?

As bovine tuberculosis is found in a wide range of wildlife and domestic animals, methods of transmission may vary between species depending on location and environmental factors. Many animal-to-animal infections result from direct or indirect contact at watering points and on communal rangelands. Smaller wildlife species may cross park boundaries due to poor perimeter fencing or as a result of fluctuating environmental conditions like flooding and fire. These conditions can enhance the potential for disease transmission between wildlife and livestock herds on farming land adjacent to the park boundaries. Additionally, Mycobacteria may survive in the environment (in water, soil, mud and on pasture) for extended periods of time, facilitating further routes of transmission given favourable circumstances (Wray *et al.*, 1975)

Transmission from animals to humans is attributed to two primary routes; inhalation and ingestion of bacilli (Daborn *et al.*, 1993). Aerosol infection results from direct contact with infected animals via livelihood practices including sheep herding, milking and sleeping in bomas overnight to prevent stock theft. Ingestion of bacilli is primarily via the consumption of infected meat, bushmeat, unpasteurised milk and other dairy products made from infected milk. As 90% of the total milk produced in Africa is consumed raw or soured, (Walshe *et al.*, 1991) and is often consumed within 30 minutes of milking, the risk of infection is likely to be highest in communities with small scale dairy production (Karimuribo *et al.*, 2005). Farmers who keep cattle and goats for food, hides, bride wealth or ritual slaughter purposes may also be at an increased risk of infection.

In order to estimate the likelihood of zoonotic disease transmission it is important to quantify the extent of close association between humans and animals. In 2002 it was estimated that over 80% of Africans lived in rural areas and were solely dependent on livestock for both food and financial security (AU / IBAR, 2002). By 1997, the simultaneous population explosion of the previous decade had resulted in over 180 million undernourished people, who were consequently at an increased risk of disease. It is therefore of concern that 29% of the world's land surface is used for livestock production, but over 80% of the animal and human population are located in areas without active health and disease surveillance services (Cosivi *et al.*, 1998). Hence, it may be concluded that due to the number of infected animals that will remain undetected, BTB incidence is likely to be grossly underestimated on a global scale. Thus, as the levels of association between humans and animals inevitably increase with land use change and increasing population densities, the risks of zoonotic disease (including BTB) infection will be further amplified. Strong links between human and animal health services will be ever more critical in order to tackle the problem of zoonotic pathogens in a timely and effective manner.

Zoonotic TB (BTB): Why should we be concerned?

Although tuberculosis that infects the respiratory system can often be cured with long-term medication, bovine tuberculosis presents many challenges for effective treatment in humans. As BTB is often transmitted via the ingestion of bacilli, the clinical manifestation is often in areas other than the lungs, referred to as extra-pulmonary (EPTB). Consequently EPTB often remains undiagnosed for lengthy periods, during which the patient may be infectious and transmit the bacteria to other individuals (Ayele *et al.*, 2004). Unfortunately, BTB is drug resistant to an increasing number of front-line drugs (Guerrero *et al.*, 1997), resulting in prolonged illness, expensive treatment regimes and high levels of mortality. It may also reactivate latent TB and co-infect patients with other strains of TB which further complicates possible treatment options (Prasad *et al.*, 2005). It is estimated that 9.4% of the global TB burden is extra-pulmonary; (Gervois *et al.*, 1972) however there is no data available to delineate how much of this may be attributable to BTB.

Considering the widespread distribution of TB and BTB, and the heavy reliance on unpasteurised milk in developing nations, it is likely that the true levels of infection are greater than currently thought (WHO, 2002). For example, in South Africa and Zimbabwe, over 25% of all new TB cases reported in 2003 were extra-pulmonary infections, as well as over 34% in Ethiopia, 20% in Tanzania

and 12% in Mozambique (WHO, 2005). Studies from Tanzania by Kazwala *et al.* (2005) indicate the real potential for BTB to act in a zoonotic capacity. Results confirm that 28.6% of all tuberculosis within the study group was attributable to *M. bovis* infection; 86% of which went on to develop extra-pulmonary disease. These results clearly signify the urgency with which the links between BTB and EPTB should be explored, quantified and addressed in southern Africa.

The role of HIV: a driver of TB disease or merely a contributing factor?

Eighty-six percent of the global caseload of TB / HIV co-infections is located in southern Africa (Corbett *et al.*, 2003). South Africa has the highest level of dual infections, with over 50% of TB patients being concomitantly infected with HIV (WHO, 2005). As over 75% of the world's HIV cases are located in southern Africa (Corbett *et al.*, 2003), there is tremendous potential for Mycobacteria, including BTB, to infect the population due to people's compromised immune status. Data suggest that HIV contributes to the risk of TB infections, and over 20% of HIV patients display multi (TB) drug-resistance while over 15% have extra-pulmonary disease; both of which are part of an increasing trend (WHO, 2005). It is unknown if these patterns are directly connected to *M. bovis* infections as adequate tests are rarely performed. However it is imperative that the capacity for BTB to act preferentially as a zoonotic pathogen in HIV patients be quantified so that this may be factored in to future disease control programmes.

Why is zoonotic TB (BTB) ignored?

Although BTB had a major influence on human health in Europe and the USA in previous centuries (Cosivi *et al.*, 1995), most developed countries have successfully eliminated the public health risks associated with BTB. This has been achieved by implemented and enforcing strict milk pasteurizing and meat inspection regulations at the national scale. Consequently, BTB has received scant attention from western pharmaceutical companies, resulting in poor advances in prevention and treatment since the development of the BCG vaccine in the 1940s (Ayele *et al.*, 2003).

Unfortunately, in many developing countries, the implementation of measures required for disease control is hindered by generally poor infrastructure and a lack of trained professionals. Despite a national policy for vaccinating children against TB in South Africa, only 58% of the annual BCG vaccinations were administered in 2004 (WHO/ UNICEF Report, 2004). From the animal health perspective, South Africa is under pressure with only 2306 registered veterinarians to cover multiple-disease testing for the commercial, private and rural health sectors (Personal communication, South African Veterinary Council). In short, many remote areas do not have a permanent, reliable health care service. Thus, under the constraints of restricted time, location and manpower resources, the issues of zoonotic disease may be considered a low priority in southern Africa. This is especially disconcerting given the overwhelming incidence of HIV (6.2 million cases and 0.52 million deaths in 2003) and TB (0.23 million new cases in 2003 and 2005 - WHO). It is imperative that research be conducted on the potential role of BTB in public health, so that an accurate assessment of the disease's impacts can be factored in to future public health decisions and programmes.

The way forward: priorities for research

In order to understand of the role of BTB in human and animal health, the following points have been identified as priorities for research.

Firstly, it is important to quantify the prevalence of *M. bovis* in:

- a. Wildlife maintenance hosts
- b. Communal livestock herds, especially species used for meat and dairy products
- c. High-risk human populations, including immuno-compromised individuals with HIV/AIDS, farmers and persons living in close association with animals in rural communities.

Secondly, it is important to assess the practical risk factors and relative importance of multi-directional infective routes between each group. This should include investigating the influence of

socio-economic factors on the risk of zoonotic tuberculosis infection, and also on access to animal and human healthcare.

Finally, steps should be taken to effectively map Mycobacteria-related disease data and develop predictive, spatially explicit models for zoonotic disease transmission in southern Africa. Only by combining the human and animal health data in a user-friendly and easily understood medium will multi-disciplinary research be encouraged over the longer term. Without the sustained commitment of professional health workers, the capacity to implement prevention and control programmes based upon the research findings will be compromised. It is hoped that the development of a simple health database will bridge the current gaps noted in disease control and surveillance, and lead to more effective health provisions for people and animals.

How does this apply to the GLTFCA?

In order to move forward in disease control, it is essential that quantitative data on the current status of disease both within and adjacent to the existing and proposed GLTFCA park boundaries be obtained. Participants linked to the initiative should be willing to work in a cross-disciplinary manner and be ready to actively engage a range of stakeholders, including park personnel, veterinarians, medical professionals, social scientists, policy makers, government officials, health economists and members of the local communities. Only by addressing and integrating the priorities of each group will effective disease control programmes be established, and only through this will the longevity of the GLTFCA be assured. A healthy park and healthy environment cannot be attained without the involvement of the local stakeholders, and as such it may be justifiably concluded that disease has the ability to make or break the future of the GLTFCA. Disease increases the pressure on resources, communities and park conservation priorities, so it is fundamental to the success and sustainability of the GLTFCA to consider health as a top priority. With good scientific data, cross-disciplinary discussion, and the necessary political commitment, the 'health' of the GLTFCA can be secured.

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Discussion.

1. *Funding.* The biggest immediate problem is funding. We are looking for areas of interaction between humans, livestock and wildlife and have information on humans and wildlife but not on livestock movements and levels of BTB infection. So the first challenge is to establish the facts and for that R5 million is needed to carry out the appropriate surveys, obtain the GIS data needed and do the modeling.
2. *Role of social change.* In Mozambique, during the war years (1972-1982), the incidence of BTB in the cattle population that was tested was reduced from 55% to 13.5%. Since 1994, and the introduction of a democratic government, it has escalated and had again reached the 55% level in 2002. Social change can thus be an important factor.

5.3 Report on Sengwe Communal Land BTB Survey. Lisa Marabini and Keith Dutlow

Summary

A prevalence survey of bovine tuberculosis (BTB), foot and mouth disease (FMD), and brucellosis, and a disease detection survey for trypanosomiasis were undertaken in cattle in the Sengwe communal land between November 2004 and June 2005. The institutional home of the PPF-funded study was the Wildlife Veterinary Unit (WVU), Division of Livestock and Veterinary Services (DLVS), Harare and the project was supervised by Dr Chris Foggin.

The survey included the completed TB testing of 2000 cattle (excluding 111 which either could not be found on the reading day or whose data were incomplete) by the comparative intradermal tuberculin test using DEFRA guidelines. The latter state that if the reaction at the bovine site is more than 4mm greater than the reaction at the avian site, the cow is considered a positive reactor; if the bovine reaction is between 1 and 4mm greater than the avian reaction the animal is considered to be an inconclusive reactor and should be retested in three months; if the bovine reaction is less than 1mm greater than the avian reaction the animal is considered negative.

Cattle were tested at the six DLVS diptanks in the south east corner of Zimbabwe (Dumisa, Samu, Davata, Pesvi, Chikwarakwara, and Chipise). The DLVS issues stock cards to all cattle owners who dip their cattle and thus a tally of stock in the area is kept. The total cattle population of the area was estimated from these figures, and then the proportion needed from each diptank to achieve the target figure of 2000 cattle was estimated. Individuals were selected randomly each day (usually every third animal depending on the day's target and the turn out), although only the quartile with the lowest body condition scores were selected for *tryps* testing. The GPS co-ordinates of all the homesteads of the tested cattle's owners were recorded after reading the results on day 3.

Five hundred and eight EDTA blood samples were collected for *tryps* testing, and thick and thin blood smears were made daily for this purpose. These were submitted to the parasitology department of Central Veterinary Laboratories for analysis.

Two thousand and two sera samples were also collected for FMD and *Brucella* testing. These have only recently been sent to OVI, therefore the results are not yet available.

Results:

A total of 6164 cattle were seen (this is the total of all stock on all cards presented), and as 2000 were tested, this represents a sampling fraction of 32.45%. There were no positive reactors, although there were 17 inconclusive reactors of which 4 were at Dumisa, 6 were at Samu, 3 were at Davata, 2 were at Pesvi, and 1 each was at Chikwarakwara and Chipise. Unfortunately, despite our recommendations, we were not given an opportunity to retest these animals due to funding constraints, although their details and homestead GPS co-ordinates have been submitted to the WVU.

The total number of owners seen was 420, and the DLVS figures for the total number of cattle owners is 624, so this represents a sampling fraction of 67.3%. The average herd size was 15 (this compares to 15.5 in a CESVI survey done in the area), and the projected cattle population in the area is 9158.

According to the basic statistics the level of confidence to detect disease at a prevalence of 1% would be 100% (expected error 0.38% at 95% confidence interval) for the cattle we tested, and a similar figure of 100% with 0.39% error would be expected for the projected population.

Recommendations:

- The 17 inconclusive reactors should be retested as soon as possible and, if suspicious, culled for BTB sample collection and the owners compensated.
- The buffalo in the Limpopo corridor that cross between Zimbabwe and South Africa should be tested for BTB as a matter of urgency.
- If indeed no positive reactors are found in the above tests the necessity for a fence on the Northern border of the Zambezi becomes more urgent.

- A continuous BTB surveillance system needs to be set up by the veterinary forces in the region so that cases could be eradicated as they are found. To this end some serious funding for capacity building and testing facilities in the area is crucial.

Discussion

1. BTB and fences. The presence of BTB in the Sengwe communal land or elsewhere in the SE lowveld of Zimbabwe would increase the chances of a fence being built to separate Kruger from Zimbabwe. Elephant do move between Kruger and the Gonarezhou and there is almost certainly exchange of buffalo between the two areas – not directly but through southeast / northwest movement via Mozambique. Increased surveillance is certainly needed.
2. In the late 1960s on Liebig's Ranch in the SE of Zimbabwe there was a major BTB problem and some 40,000 cattle were tested annually. In 1978/79 the country was declared BTB free and none has been detected in abattoirs.
3. A fence separating Kruger NP from much of the Sengwe Communal Land in SE Zimbabwe is likely to be constructed which has little to do with the presence of BTB or other disease issues. There are plans to erect a fence along the edge of the Limpopo riparian on the northern bank so that both banks will fall within a protected area and so create a protected riparian area covering both southern and northern banks that will be attractive to tourists. The plan for the "Limpopo Strip" is part of the development of the Sengwe Corridor linking Kruger to Gonarezhou.

5.4 BTB roundtable update on current research, major findings, unanswered questions and research plans/priorities in the GLTFCA. Wayne Getz, Markus Hofmeyr, Nick Kriek, Anita Michel, Roy Bengis, Carlos Pereira, Lisa Marabini, Keith Dutlow, Claire Geoghegan.

The discussion was initiated by Wayne Getz and the following points arose:

1. There could well be a resurgence of BTB in the region comprising the GLTFCA but the most frustrating part is the lack of information on the distribution and incidence of the disease. This is a major gap in knowledge and it may well be present in rural populations and linked to the HIV-AIDS pandemic.
2. The costs of stopping BTB in Kruger when it was discovered would have been extremely high. There is an urgent need to continue monitoring and given the lack of information, which applies worldwide, it is very difficult to quantify the risks- and the tools to control are not presently available. Part of the problem is that it is a slow disease and it takes time to get a handle on it.
3. There needs to be a special focus on maintenance hosts, and smaller mammals are more likely to pose a risk for zoonotic potential. Monitoring does not necessarily help but vaccination programmes are critical. There is an urgent need for more practical diagnostic tests that can be applied in the field to animals at all stages of the disease. Surveys are nevertheless difficult because false negatives can occur even in the advanced chronic stages of the disease.
4. The BTB problem is a good example of complexity! A multi-host disease in a multi-species system.
5. It is difficult to contain buffalo within the Kruger NP and there are almost daily reports of them breaking out. Surveillance of cattle populations will begin in July. On the Mozambique side sustainable monitoring of 10,000 animals is required. Current information is that the incidence is low but this needs to be confirmed.
6. By comparison with the rest of Africa, Kruger has a level of knowledge about the disease and the research here is of great value to the rest of the continent.
7. Given the risk to humans, why can't we frame a decent argument to attract funds and political support? A major constraint seems to be the major division (separation?) between animal and human health. There is clearly a need to expose these problems.

8. Current beliefs about the disease, such as single infections and latency in humans, are incorrect. People can be subjected to multiple infections- and the diagnostic material for detecting such infections are not available but are needed.
9. There is an need to draft a brief (3-page) document that makes a good case for supporting BTB surveillance, monitoring and research that can be taken to the major donors to tackle the problem. Much of the argument needed can be based on the data presented here today by Claire Geoghegan. Wider issues are at stake, both social and ecological, and there should be wider interest in the problem.

5.5 Foot and Mouth Disease Epidemiology and Research Needs in the Greater Limpopo Transfrontier Conservation Area (GLTFCA)

Wilna Vosloo and Gavin Thomson

Summary

Foot and mouth disease (FMD) within the Greater Limpopo Transfrontier Conservation Area (GLTFCA) is unlikely to have any serious negative effect on wildlife because SAT1-3 viruses are historically endemic to the region; unless, of course, new virus types/variants enter the ecosystem. The real problem posed by FMD viruses is that they are capable of spreading to the intensive livestock production areas of countries of the region where the effects are potentially two-fold: (1) lowering of the productive capacity of intensively farmed cattle and pigs and (2) disruption of trade in livestock commodities within and out of the region.

This situation is not new to southern Africa and Zimbabwe, particularly, has suffered repeatedly from the trade effects of FMD in the last 40-50 years as is currently the case; Zimbabwean beef has been prohibited access to markets in the European Union for the last 4-5 years because FMD is perceived to be out of control in that country. What is new is that novel topotypes of SAT viruses were introduced into south-eastern Zimbabwe in the 1980s -1990s by translocation of buffalo from the north of the country. Depending on how efficiently these new topotypes propagate within the buffalo population of the GLTFCA, the control of FMD through vaccination could become more complicated. Thus research is urgently needed to understand to what extent these topotypes are still present in the Gonarezhou and possibly more widely.

Control of FMD in southern Africa has historically been based, with considerable success, on (1) separating buffalo populations from wildlife using game fencing of various types, (2) bi-annual vaccination of cattle populations close to buffalo infected with SAT-type viruses and (3) complex zoo-sanitary controls on the movement of cloven-hoofed animals and products derived from them. In South Africa, FMD control was greatly facilitated by the erection of a perimeter fence around the Kruger National Park (KNP) in the 1960s. The problem is that keeping buffalo within the KNP has become increasingly difficult for a variety of reasons. This has resulted in two serious outbreaks of FMD in South Africa in the last 5 years which originated from buffalo within the KNP, one of which spread to the FMD-free zone of the country and to Swaziland.

Because of the complex zoo-sanitary measures imposed by animal health authorities to control FMD in Mozambique, South Africa and Zimbabwe, the possibilities for livestock production and marketing from areas adjacent to the GLTFCA are likely to remain constrained. Furthermore, these measures will likely be rendered still more complex because the GLTFCA fence will *de facto* become the international border of each country with its neighbours. Thus the present contentious issues around the KNP perimeter fence on the South African side (animal disease and problem animal control) will be complicated by the need to control the movement of people as well as animals and their products. This is apt demonstration that the idea that animal disease control issues can be based exclusively on narrow technical considerations is long gone. Unfortunately, some national and international organisations involved in animal health still do not recognise this reality. This is therefore an area where considerable extension work, if not actual research, is required.

On the other hand, there is growing realisation that new concepts such as “compartmentalisation” and “commodity-based trade” offer possibilities for a diversified approach to FMD control, as well as control of other diseases. The basic point is that through these approaches and thus adaptation of a new attitude towards problems associated with credible certification of traded commodities, there are new opportunities for simultaneously improving animal disease control while lessening the impact of diseases like FMD on trade in livestock commodities and, thereby, on rural development.

International events such as the current hysteria around avian influenza, FMD, bovine spongiform encephalopathy (including atypical scrapie), although they muddy the water, will increasingly push the development of alternative approaches to animal disease control and their interaction with socio-economic realities. The reason is that currently propagated approaches to controlling these problems are progressively being shown to be inadequate or at least in need of radical improvement. More rational, affordable and socially justifiable solutions are therefore called for. In our opinion, this need will lead inevitably to more diversified approaches that will not be the exclusive preserve of animal health authorities.

In this context the establishment of the GLTFCA creates both a problem and an opportunity:

- How to develop more effective animal disease control strategies for FMD (and other diseases) that are less inhibitory to rural development;
- An opportunity for southern African countries to lead the initiative towards developing efficient and effective animal disease control integrated with broader development goals.

Discussion:

1. *Meat exports.* How important is the meat export trade to the southern African region? The Botswana meat industry is bankrupt. Is it worth pursuing high standards? Would it not be better to focus on trade within Africa?
 - a. Huge amounts are being spent in South Africa to maintain disease-free status and be able to export meat but the cost / benefit analyses do not seem to have been done.
 - b. Despite the investment in maintaining FMD free zones, South Africa is still not able to export game meat to Europe because of suspicion that it is not fully controlling FMD.
 - c. The full economic (as opposed to financial) costs to the country of maintaining FMD free status need to be examined – perhaps the expenditure is only benefiting a small segment of the country’s economy.
 - d. South Africa is now a net importer of meat. Trade in embryos is also important but the key question is, where does SADC want to be in 20-30 years time? Presently the meat industry contributes about 4% to GDP.
2. *Beef exports and wildlife.* In Zimbabwe an enormous amount was spent on supporting veterinary services to facilitate the export of beef to Europe at favourable prices while the wildlife industry, with virtually no support from Government, was earning more foreign exchange from safari hunting than were beef exports.
3. *Vaccination.* In the aftermath of the UK FMD outbreak the consensus has now moved towards using vaccination as a control method in place of trying to maintain disease-free status without vaccinations. South America has convinced Europe that vaccinated cattle are disease-free and exports beef to Europe. The political dimensions to FMD control and trade barriers and preferences clearly affect imports from Africa.
4. *Compartmentalisation.* Hygiene and disease control standards are eventually going to apply to all pathogens threatening food safety, and instead of attempting to control disease over vast areas of the countryside it may be more prudent to involve compartmentalisation in spatially limited high production units or zones. In contrast to a compartmentalisation approach, Tanzania is presently

considering fencing programmes along the lines of the Botswana model which would have huge adverse impacts on pastoral societies and wildlife.

5. *Bushmeat*. If more meat derived from livestock were sold in Africa it could have an impact on the bushmeat trade.
6. The TFCA would benefit from a trade strategy that did not require fences but could benefit buyers and traders in other ways – e.g. “green beef.” Certification systems are being developed in relation to tourism and its social and environmental impacts and implications. These certification schemes are likely to have an impact on the viability of tourism over the longer term. The principles are presently being developed, and Anna Spenceley indicated that they would be willing to share these- could be applied to commodities like beef? [This is being done in Namibia- “cheetah friendly beef” program of the Cheetah Conservation Fund. – ed.]

5.6 Tick-borne Diseases: Some Perspectives and Research Opportunities in the GLTFCA

Graeme Cumming

Summary.

I first presented some background and results from published work on ticks at broad scales. To summarize, these results show that tick-host relationships are complex and not necessarily unique, with most ticks feeding on a range of different hosts. At continental scales, tick occurrences seem to be driven primarily by climate. At finer scales, other factors such as host distributions and vegetation structure are likely to become increasingly more important. The problem is made more difficult by the need to understand spatial distributions of hosts and parasites simultaneously before a reliable picture of trophic interactions can be developed.

In the GLTFCA, I suggested that many of the key questions involve relating changes in habitat, host communities, tick communities, and pathogen communities to one another. Most research questions of interest will involve addressing the management of tick-borne diseases in the park while improving scientific understanding of tick biology and host-parasite-pathogen dynamics.

There are a number of possible focal questions for research. I consider the following hypotheses to be of particular interest:

1. H: Overall tick abundance will be of far greater importance for the spread of disease than tick community composition, because ‘problem’ tick species are so generalist. In other words, I hypothesize that ticks of the key species in the park are generalist enough that a single abundant vector can transmit pathogens effectively (here and below, I am thinking of pathogen transmission to both humans and their livestock). The competing hypothesis is that community composition matters, and that there should be a link between the diversity of the pathogen community and the rate of pathogen transmission.
2. H: Mammalian host community composition will be important for the transmission of disease, because host species will show different resistance to and varying abilities to transmit different pathogens. The relative roles of big vs. small mammals (rodents vs. ungulates) are likely to be important. There are numerous, potentially fascinating study topics here. For example: do predators, both of rodents and ungulates, reduce the incidence of the most important tick-borne diseases? Does higher ungulate diversity promote or reduce pathogen transmission? Does higher mammalian diversity support higher tick diversity and a higher diversity of pathogens, or not?
3. H: Disease transmission is more likely in ‘disturbed’ landscapes (human-, cattle- or elephant-modified, simplified systems) because simplified systems will permit ticks of opportunist species to multiply rapidly and reach high abundances in the absence of potential tick predators such as lizards, ants, birds, rodents, and even fungi (including fungal infection of eggs). Engorged female ticks should be a rich prize for any of these species. This hypothesis is partially a corollary of H1.

4. H: There are thresholds for transmission of tick-borne pathogens that can be identified and managed, because pathogens are usually scarcer than their hosts. For instance, keeping pathogens in the system may require a minimum abundance of ticks or a minimum diversity of ungulates. Note that the pathogens depend on the ticks, which depend on the hosts, which depend on the habitat. After a major disturbance we can expect a recolonization of an area in the reverse order – i.e. plants, hosts, ticks, pathogens. Being at the end of the chain, pathogens may be vulnerable in unexpected ways to source-sink dynamics, population fluctuations and trophic cascades lower in the food web. The relative role of humans and domestic animals (goats, cattle and sheep) vs. other species in the system is not known. In Africa, cattle are known to be hosts to at least 100 different tick species (out of c. 240 known African species) – having not gone through the evolutionary mill in the same way, they may be better food than most other ungulates. Of course, sampling has been biased, so we don't really know how they compare.

Discussion

1. The analysis was based on all mammalian species, not just cattle, and covered >30,000 tick-host records. Answering the question of co-speciation was partly hampered by the absence of good phylogenies for ticks but comparisons at the order and generic level showed that ticks were generalists.
2. Historical data were used and there is a considerable amount of new data for southern Africa and separation of life history stages in multi-host species may reveal some measure of host specificity. There have been recent changes in taxonomy of ticks.
3. The analysis presented was based on broad scale data. There is a need to examine tick host relations and tick behaviour and physiology and very much finer scales in order to develop more holistic predictive models that can be scaled up and based on, for example, tick physiology.
4. Small game farms in South Africa would provide suitable sites for fine scale studies. Many of them find they have no tick problems until they introduce key species, such as white rhino and giraffe, which are preferred hosts for adult ticks. In small parks, the animals also can't move out of the range of ticks.
5. The work of Jaqui Minshull in Zimbabwe established that small game parks have higher tick populations and she looked at the effects of fire on tick population explosions in Kyle Game Reserve – not much ecological work has been done on ticks in South Africa.
6. Q: Have you looked at pathogens? A: Done a course study on correlations between climate and ticks, and between ticks and pathogens, but not between climate and pathogens.
7. If there is little evidence of co-speciation between ticks and their hosts, is there host specificity in other vectors? Mites are the classical example (as are fleas and lice).
8. Predicting the effects of climate change on ticks, vectors and pathogens is likely to be problematic and a good example of dealing with a complex system.

5.7 Databases and GIS for the GLTFCA – Veterinary Information Management System

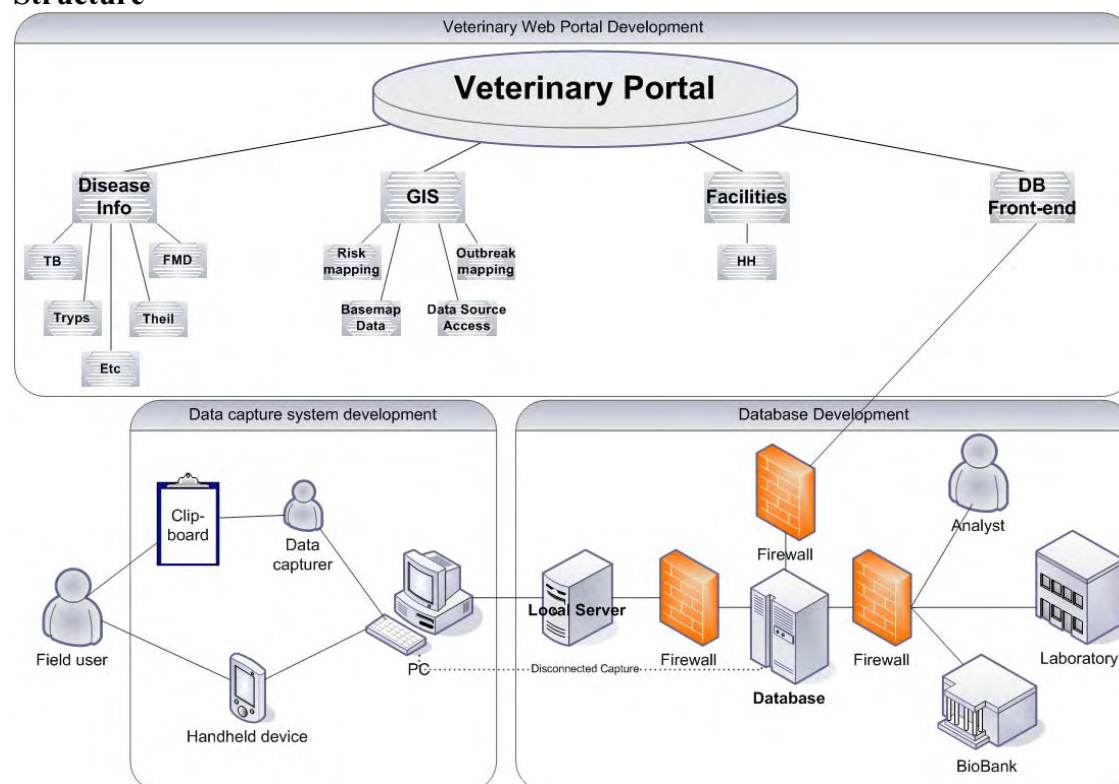
Louis van Schalkwyk, *TFCA Veterinary Programme, Peace Parks Foundation*

Summary

Background

- Project started in 2004
- Investigation of wildlife / rural livestock role players' information management (IM) capacity
- Found severe lack of IM capacity & information sharing
- Workshops to determine needs (software (incl. functionality) / hardware)
- Investigated available veterinary IM Systems (TADInfo, ZIMS, etc)
- Conceptual version of data capture system designed
- Expanded in 2005 to include Veterinary Portal and Veterinary GIS capacity

Structure



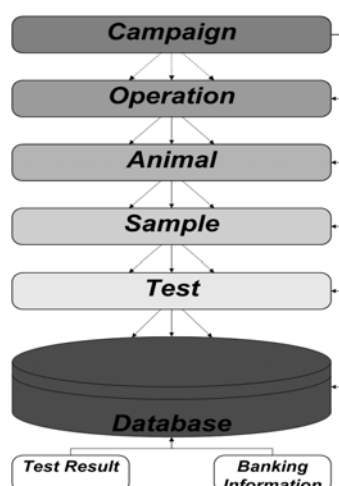
Data Capture

- Electronic field capture system
 - Custom software development (OpenSource)
 - Via handheld electronic devices (ideally)
 - Hard copy capture still possible
 - High level of functionality to decrease data capture time
 - Hierarchical structure to reduce data input duplication
 - Single click entries to reduce input errors
 - Customizable
- Synchronization capability (up- and downward)

Central Database

- Central data repository for data capture system
- Access control for protection of IP and sensitive data
- Direct linkage to sample bank to enable sample tracking and inventory

- Possible direct linkage (or through web) to laboratories and/or lab equipment



Challenges

- Various role players in different countries
- Non-standard methodologies
- Remote & harsh data collection environments
- Time constraints in field with immobilized animals
- Unreliable connectivity
- Lab personnel used for data capture – decreased productivity
- Currently: Limited information generated from data due to cumbersome and/or inadequate data management

Web Portal

- Various role players in different countries
- Non-standard methodologies
- Remote & harsh data collection environments
- Time constraints in field with immobilized animals
- Unreliable connectivity
- Lab personnel used for data capture – decreased productivity
- Currently: Limited information generated from data due to cumbersome and/or inadequate data management

Status

- Funding
 - Secured by Peace Parks Foundation
 - Project of TFCA Veterinary Programme
- Data capture system & Database
 - Software developing company contracted to develop data capture system & central database
- Web Portal
 - Web development company contracted to develop veterinary portal

Time frame

- Data capture system & Database
 - First version (post-testing) - 2007/2008
- Web Portal
 - First phase – info sites & infrastructure - 2006
 - Second phase – GIS & database web interface - 2006/2007

Management

- Establishment & initial management of database - PPF
- Database Administrator - To be appointed as soon as database implemented

- Hardware - Initial setup by PPF
- Future management - National/International scientific organization

Discussion:

1. The existing PPF GIS databases were not suitable for wildlife data which is why a new database is being developed. It is difficult to capture research data because each research worker uses different methods, however, databases are becoming more flexible and links between databases are becoming more flexible.
2. NCEAS have developed major data bases and working on one for South Africa and would it not be sensible to link into their system rather than re-inventing the wheel on this?
3. Medical database systems interact with different systems and are able to provide doctors with daily information on patients and medical database design is forming the template of the PPF database system

5.8 Transboundary Protected Areas Research Initiative Anna Spenceley

Summary

OUTLINE

- Overview of the Transboundary Protected Areas Research Initiative (TPARI) – linkages, modes of collaboration
- TPARI research - themes, current research projects, recent progress
- Current gaps in nature-based tourism research - including hunting and photographic wildlife tourism
- Potential linkages/collaboration between AHEAD and TPARI – and contributions to AHEAD research priorities

1. TPARI in a nutshell

- Research network running under auspices of IUCN-SA
- Initial funding from NSF via Centre for the Integrated Study of the Human Dimensions of Global Change, Carnegie Mellon University
- Human and social dimensions of TBPA's / TFCAs in Africa
- 28 researchers over last two years
- Two post-doctoral fellows: on tourism and CBNRM survey/assessment
- International linkages

2. International linkages

- **Key partnerships:** IUCN South Africa
- **Key relationships:** DEAT, SANP, PPF, EWT, SAVANNA consortium, WCPA-IUCN TBPA Task Force, AHEAD
- **Southern African university partners:** Wits, Stellenbosch, Johannesburg, Cape Town, Western Cape (PLAAS)
- **North American universities:** Bates College, Carnegie Mellon University, Johns Hopkins, Indiana, Georgia, Berkeley Calif., British Columbia, Montana, Michigan
- **European universities:** Wagenigen, Vrije Amsterdam, TU Berlin, Finland, Mainz

3. Modes of collaboration

MoU

- Formal inter-institutional MoU
- Formal researcher MoU

Informal agreements & informal participation in network**Benefits:**

- Library & research platforms
- Proofing of research topic
- Research design
- Logistical support & registration procedures
- Field mentoring (academic)
- Networking & research synergies
- Funding & fundraising
- Exposure and peer review (teleseminars/website)

4. Research themes**Human-environment relations:**

- Climate variability, environmental disaster, resource limitations,
- HIV-AIDS & resource use

Decision-making and governance:

- Political ecologies, planning & participation,
- PA Management and co-management

The social and economic framework:

- Land rights, resource rights and livelihoods,
- Tourism development, economic development and beneficiation,
- Cultural landscapes, cultural histories, cultural & social impacts

5. Projects**Senior researchers, post docs & PhDs**

- PAs: does collaborative management make a difference? Comparative study (PhD)
- Agricultural development project next to park (PhD)
- SANP approaches to engaging community (PhD)
- GLTP, ENSO events & livelihoods (PhD)
- Survey & assessment of 'CBNRM' interventions (post doc)
- Tourism investments in GLTP (post doc)
- States, markets and conservation (PhD) GLTP history and NGO relations (post doc)
- Do TBPA's help? (PhD)
- Understandings of land & place among the displaced people from the GLTP (PhD)
- Digitisation of TEBA Archives
- Multi-objective decision-making model for Kruger to Canyons (looking for funding) (senior researcher)
- Agroforestry study in Limpopo National Park (PhD)
- Woodland conservation & EE: comparative SA and Nigeria (PhD)
- Indigenous knowledge systems and disaster preparedness

MA / MSc

- Concept of 'Peace Park' and implementation in SA
- Conservation & livelihoods in Makandizulu, LNP
- Madimbo Corridor land claim
- Private game farms and transboundary conserv.
- Gender and Indigenous Knowledge in LNP (Hons)
- Community participation in Kgalakgadi: park perspective
- Network Analysis of 2 villages

- 2 Cultural Tourism case studies
- Makuleke training project (BA Hons)
- Distribution of iron age habitation in Pafuri

6. Recent Progress

- USAID study – NRM case studies (Namibia, Botswana, Zimbabwe, Malawi)
- Social mapping of KNP – GIS mapping human and cultural landscape (planning phase with SANP and PPF)
- SANPAD joint projects -
 - (a) legal dimensions of TFCA conservation
 - (b) land claims and land reform in GLTP
- Postdocs on GLTFCA –
 - Dr Wolfram Dressler - completed 1-year on CBNRM – teleseminar and papers in 2006
 - Dr Anna Spenceley – 2006/7 NRF research fellowship - sustainable tourism research (2nd year)
- Post social indaba process (special edition Conservation and Society Journal)

7. Nature-based tourism research gaps – relevant to AHEAD

For Nature-based Tourism (NBT) – consider photographic wildlife tourism and hunting in particular

Policy/Planning

- What are implications of land tenure and reform for NBT, wildlife management and biodiversity conservation?
- What are the policy implications for transboundary NBT and alternative livelihood approaches?
- How does the planning approach (*e.g. level of participation*) influence sustainability?

Environmental

- What are implications of animal health for NBT? (*hunting / photographic*)
- What are the implications for climate change and NBT? (*two-way impacts*)
- What different implications are there for WHS/TFCA/ NPs/Biospheres for NBT and conservation and stakeholders?

Economic

- \$ impacts of wildlife diseases on hunting/CBT/NBT and implications for \$ to business and rural livelihoods
- What are the options/best practices for alleviating poverty through NBT?
- What is the relative importance of NBT in conservation finance?
- What are the impacts of NBT on poverty?
- How resilient are different NBT sectors? (*e.g. to instability*)
- How can risks be managed? (*e.g. disease, instability, climate change*)

Social

- What are the impacts of human disease (e.g HIV/AIDS) and wildlife disease (e.g. BTB) on the NBT sector?
- What are the social / cultural impacts during the destination life-cycle, and in relation to alternative livelihood options?
- What are the social, cultural and spiritual impacts of NBT?

Holistic

- What are the dynamics between conservation, and local economic development (esp. poverty alleviation) and society in NBT? (and consider sustainable alternative livelihood options)

8. Potential contributions to “AHEAD- GLTFCA draft projects summary table”

Theme #4, Human livelihoods, animal health and ecosystem goods and services

Tradeoffs between alternative landuse enterprises – e.g. tourism, agriculture etc - CBA

Effects of alternative policies on development, adaptability and resilience

e.g. regarding land tenure, commercialisation, PPPs (Public-Private Partnerships)

#5 Policy support and capacity building

6 Communications and outreach – teleseminars (presentation – prepared critiques – potentially wide geographical distribution – discussion), TPARI network & linkages etc.

Other related research options:

- Wildlife and disease issues relating to socio-ecological systems (e.g. sustainable livelihoods, poverty alleviation implications)
- Implications for viability of nature-based tourism as a livelihood option (hunting / photographic) / business option
- CBA / scenario planning on wildlife, tourism & livestock options
- Access to TPARI network of socio-economic researchers
- Joint research funding proposals

Discussion:

1. The link between disease and nature based tourism (NTB) needs to be emphasized.
2. In South Africa the demand for FMD free buffalo (at very high prices) has resulted in them being moved into farming areas from which they have long been absent. While free of FMD they may not be free of other diseases (such as theileriosis) with the result that they become a threat to neighbouring rural cattle populations with subsequent claims for compensation that are not always justified being lodged and complex social dynamics developing that vets are not equipped to deal with. Social scientists may be able to assist in these cases and this might be a good opportunity for collaboration with TPARI.
3. A consideration of the political and social risks of TFCA development is not the focus of today's AHEAD-GLTFCA deliberations. In general, local resistance to TFCAs is often put down to 'ignorance' of rural people and the question is how do we bring about change in the perceptions of both parties involved? There is a need to foster community involvement in the process of TFCA development and planning and to help both rural people and TFCA developers appreciate issues of dealing with complex systems and complexity. So far TFCA development has been mainly top-down, but we need both top-down and bottom-up approaches. Two-thirds of local people have never heard of TFCAs. However, in the development of the Sengwe Corridor there have been initiatives to involve local communities on both sides of the Limpopo and there is high level of awareness in this particular area.
4. The need to further develop links between TPARI and the programme were emphasized as was the need to further develop the involvement of social and economic scientists in the programme.

5.9 Review of the Establishment of the Sengwa Corridor as Part of the GLTFP/TFCA

Giuseppe Daconto

Summary

The Sengwe-Tchipise Wilderness Corridor is being established to provide a connection between Kruger National Park and Gonarezhou National Park in Zimbabwe. The planning process has been supported by CESVI through a project funded by the Italian Ministry of Foreign Affairs, entitled “*Sustainable Development and Natural Resource Management in Southern Zimbabwe.*”

The presentation outlined the corridor planning process, selected local scale NRM issues, and the regional context of the initiative (south east lowveld and other TFCA components in Zimbabwe); it also highlighted questions arising from the corridor planning process which have research relevance.

The establishment of the wilderness corridor was proposed as a result of extensive consultation processes undertaken at the national and local level since 2000. Baseline appraisals and conceptual development supported a series of consultative events which eventually contributed to establishment of a framework for broader cross-sectoral and inter-agency consultation about the TFCA in Zimbabwe (at grassroots, district, and regional levels). Through this process, stakeholders clarified, inter alia, the preferred legal route for the establishment of the connection between the two parks, which would comprise about 400sq km of communal land. A consensus was achieved not to excise the area for inclusion in the National Parks estate. The area is to be established under the Regional Town and Planning Country Act, which recognizes the local authorities (Rural District Councils - RDCs) as planning authorities.

The statutory planning process is ongoing and aims at establishing a Wilderness Area with the following objectives: (a) to ensure compliance with international treaty obligations and the overall conservation objectives of the GLTFP; (b) to enable a physical linkage in the form of a conservation corridor between the Gonarezhou National Park and the Kruger National Park to enable: wildlife habitats and movement between the two national parks - tourist flows and associated development linked to the corridor and overall development of the GLTFP - regional economic development; (c) to provide opportunities for local communities to manage and derive benefits from the natural resources to be conserved in the proposed wilderness corridor.

The local stakeholders have indicated that they favor using the area for trophy hunting as the most feasible scenario for the near future. This landuse model could evolve in the future towards either national park standards or biosphere reserve standards, depending on changes in context and preferences.

Field level consultations unequivocally confirmed the local wish to retain local ownership and control over the corridor resources, to minimize potential negative impacts, and to enhance potential positive impacts associated with the initiative. Among the critical resource management issues are the management and development of surface and ground-water for domestic, agriculture and livestock consumption; relief grazing presently occurring within the proposed corridor area; separation of wildlife from people and cattle; and control of animal diseases (FMD, tryps, BTB).

The establishment of the corridor requires devising an appropriate management and institutional system, which at local scale is likely to entail a role for the CAMPFIRE programme, managed by the RDCs and for community trusts, as community associations with legal persona. The establishment of the corridor is also closely linked with ongoing planning developments at the regional scale, with particular regard to the tourism industry, the wildlife industry, and agriculture and rural development.

The process to date has been directly affected by the depressed and fluid state of the wildlife and tourism industry in Zimbabwe and, by and large, by the massive economic crisis of the country and fundamental changes in the policy context. Given the complex and uncertain planning context, CESVI, along with other stakeholders and government agencies, undertook in 2005 an analysis of alternative scenarios for the wildlife and tourism industry in the lowveld. This study identified a set of alternative futures which were reviewed in terms of economic, social and environmental benefits. This process contributed to the identification of factors constraining effective regional tourism planning and to the formulation of desired goals for the TFCA in Zimbabwe.

The establishment of the Wilderness Corridor raises important issues relevant to the livestock sector: the present state and potential impact on the local cattle economy and the traditional and often illegal cross-border economy of this border area; the management of local environmental constraints for

livestock; coping with diminishing technical and extension services; the implications of potential boundary realignment of Gonarezhou National Park; the establishment of a supportive and effective governance system over natural resources, acceptable to the range of stakeholders; the combined impact of the GLTFP (being established in Zimbabwe in a highly uncertain scenario) and potential animal disease control measures on the resilience of the agro-pastoral system and local livelihoods.

At a regional scale, a number of questions would deserve further analysis in relation to the establishment of the GLTFCA. What is the biological rationale for landscape connectivity pursued through the GLTFP/TFCA? What is the value added by cross border natural resource management established by virtue of the GLTFP/TFCA and what is its impact on local livelihoods? The GLTFP Treaty recognizes regional economic integration as one of the objectives of the regional initiative: this goal still awaits better articulation in terms of possible scenarios for the development of the rural economy and livelihoods vis-à-vis the tourism industry. What is the present, historic and potential cross-border nature of the local livestock-based rural economy? Which are the likely impacts on the local agro-pastoral system due to future changes in the tourism industry, infrastructure base, market access and structure, wildlife management and animal disease control systems, and governance systems brought about by the GLTFP/TFCA?

Last but not least: which is the most desirable management model for natural resources at the scales affected by the GLTFP/TFCA? The process and debate to date reflect more often tacit assumptions than articulate analysis of this crucial issue.

The Italian Ministry of Foreign Affairs is planning to fund a second phase of the programme established in Zimbabwe. This phase will be at regional scale and will be delivered through a partnership between CESVI and IUCN, along with Government agencies and other stakeholders in the three countries concerned.

Discussion:

1. *Mine Field.* The mine fields can be cleared. The estimated cost in a study carried out five years ago was US\$ 5 – 10 million. Earlier this year the Zimbabwe Army indicated that they would undertake the task.
2. *Biological rationale for the corridor?* It has not been a traditional migration route for animals although it could function as a dispersal corridor for elephants. Initially the corridor was expected to be much wider (about 50 km) but at that stage little consideration had been given to the numbers of people already living in the area. Both Gonarezhou and Kruger are large enough to be independent and separate entities but with climate and other future unpredictable events it makes good sense to link them into a larger, contiguous area. Disease may be one of the costs but there are other trade offs and several potential conservation benefits, one of which is that large conservation areas offer better survival potential for larger species. The major wildlife movements are up and down the drainages which run southeast / northwest of both Gonarezhou and Kruger.
3. *Cultural aspects.* The Shangaan people live in all three countries and there have been historical, and recent, movements of people across the borders. Cultural and economic ties exist across the border and the creation of a border post will formalize an existing situation. There is, however, some fear that the creation of the corridor and full establishment of the transfrontier national park may interfere with cross border connections.
4. *Top down planning.* There is high level of distrust of central government on the part of local people, with a 'disconnect' between central and local planning and interests. When little happens at the local level in terms of implementation, disillusionment creeps in and this is particularly a problem when participatory planning approaches have been used.

6. PROJECT DEVELOPMENT IN THE PIPELINE - IDRC, FOUNDATION ENSEMBLE, MACARTHUR (CLIMATE CHANGE), BRITISH ECOLOGICAL SOCIETY, OTHERS?

Discussion

1. *IDRC*. The progress in funding from IDRC for the CASS scenario planning project has already been reported in these minutes (see pp. 10-11).
2. *Fondation Ensemble*. Fondation Ensemble is a French foundation based in Paris that approached WCS and the AHEAD programme because they were interested in the work it was doing. They have invited a proposal that matches their focus on projects that have benefits both to biodiversity conservation and improved livelihoods. They require quantifiable benefits to people in the project area and they would prefer the project to be in South Africa or Mozambique. They fund projects up to about \$180,000 a year for three years. Work has started on trying to identify a suitable project within the TFCA in Mozambique that will focus on livestock health, wildlife health and benefits to people. Any suggestions from the Working Group would be welcome.
3. *MacArthur Foundation*. Mike Kock, David Cumming and Graeme Cumming met with Michael Wright and Elizabeth Chadri from the MacArthur Foundation in Cape Town during February to brief them on the AHEAD Programme and to explore potential joint interests. Their major interest is in climate change and adaptation in relation to the conservation of biodiversity, and they were visiting a number of countries in southern and eastern Africa and will be putting out a call for proposals later in the year.
4. *British Ecological Society*. The society has put out a call for proposals to support the establishment of ecological societies in undeveloped countries. Support to successful applicants would amount to £5,000 a year for five years. Steve Osofsky asked if anyone had looked at the call and thought of ways in which the AHEAD programme might benefit. No contact had been established with them. David Cumming was of the opinion that the funds were to foster or support the establishment of ecological societies and that the AHEAD Working Group initiative would not qualify. Harry Biggs had BES contacts he thought he could follow-up with, just in case.
5. *EU proposal*. Carlos Pereira reported that two local Mozambican NGOs, together with the Association for Scientific Development (ASD) and an Italian NGO had submitted a proposal to the EU dealing with livestock and human health. The results of what is a highly competitive bid will be announced in March. One of the Mozambican NGOs is particularly interested in malaria.
6. Colorado State University has a programme on infectious diseases (especially malaria) and may be able to support American students, with supervisor at CSU, to work within the GLTFCA.

7. PROPOSAL FOR A CORE AHEAD-GLTFCA STEERING GROUP (Facilitator: Cumming)

The question of a core group, or steering group or committee has arisen in several previous meetings and so far the Working Group (WG) has operated on an informal, networking basis. Harry Biggs (HB) was invited to open the discussion on the need for a steering committee. He argued that it was time a steering group was established. WCS could not be expected to support the process forever and the local agencies and individuals involved in the TFCA should find the resources to support a steering committee and the ongoing coordination of the programme. However the initiative and membership need to involve all three countries and should not be a predominantly South African effort. Bearing this in mind SANParks would be prepared to host the committee if it can find the funds to do so.

Markus Hofmeyr and Mike Murphree concurred with HB's comments and considered that it was now necessary to establish a formal steering committee. However, it should not be seen as a position of

authority or privilege and careful consideration needed to be given to its structure and membership. Networking has worked very well so far and that needed to be maintained. It was generally agreed that a formal steering committee was needed but DC pointed out that such a committee needed resources if it was to function effectively. Carlos Pereira agreed but pointed out that we needed to continue as we are until such time as new structures were in place.

Nick Kriek considered that a steering committee needed to be formalized now and greater cohesion between the various groups involved in the programme was needed. He indicated that PPF has some funds available and would be able to support 2 to three meetings of the steering committee a year. PPF would however need to see a budget before making any commitment.

Mike Kock and Markus Hofmeyr said the committee needed to include a mix of disciplines and experience and needed to work at a regional level.

Fred Potgieter expressed discomfort at the direction the discussion was going. There was lot of ongoing research being carried out, for example by OVI¹ and ARC with government and independent funding- what was needed was a listing of what ongoing relevant research existed so that members of the WG and others could link-up and network with those they needed to. He did not have time to sit on a steering committee but needed to interact with Anna and Graeme and others, for example. The tsetse policy needed to be developed and the programme needed commitment and focus, the BTB programme needed input from social economists.

DC asked if, in the light of these considerations, a formal steering committee was redundant. Are we more active and effective as an open networking group?

Steve Osofsky (SO) asked if new functions on the web site (such as 'bulletin boards' or moderated listserves/discussion groups) would help networking and communication between members of the Working Group. The option was discussed and some members felt it would be a useful addition while others had reservations about its usefulness. SO and Louis van Schalkwyk would follow-up on the matter.

The question of involving the wider network of those who have been at previous meetings but were absent this week was discussed and it was pointed out that the group was even wider and included the entire e-mail list that receives the reports and updates of the programme. Given that the universities and students were in lower attendance at this meeting (several previous meetings having been held at U of P), there could well be as many as five times as many interested people.

Steve Osofsky noted the WG was almost entirely self selected and perhaps the steering group could be similarly formed. Since there was reluctance to take any form of (s)election further forward, DC asked those participants who wished to be part of a steering committee to send him an e-mail within the next two weeks. Once a self-nominated group was apparent we could take the process forward more formally if necessary. Mike Kock thought that it may be best to leave it flexible and simple, but he did feel it was desirable to have a core group that helped to steer the process. Steve Osofsky welcomed more regular input from WG members interested in that type of involvement (e.g., steering committee).

Graeme Cumming suggested that smaller working groups which were networking within the overall programme would be an effective strategy. DC noted that Greg Simpson had earlier suggested setting up a working group to deal with medical issues and DC suggested that was an excellent way to go and would encourage it. HB asked if there were any others that wished to form working groups and Graeme Cumming said he would be happy to form a group on tick research. Claire was keen to do so for tuberculosis although that could be part of the medical group.

The question of establishing a formal steering committee was left open and pending a response from members of the WG who might wish to serve on such a committee.

On the question of formal appointments to further the AHEAD-GLTFCA programme Markus Hofmeyr noted that at a pre-meeting on Wednesday the 8th March with Peace Parks Foundation (Nick

¹ A list of relevant OVI projects supplied by Fred Potgieter can be found in Appendix 2 of this report.

Kriek), and WCS (Steve Osofsky, Mike Kock) and SANParks (Hector Magome, Danie Pienaar, Harry Biggs and Markus Hofmeyr), the possibility of joint funding for 2 essential AHEAD-related positions in SANParks was discussed. The posts would be a program manager in veterinary issues (KNP scientific services, research orientation) and a veterinary policy integrator ("AHEAD Liaison"-conservation services at HQ). The meeting went off well with commitments from multiple parties to look at the availability of funding for these very important positions

8. INSTITUTIONAL COMMITMENTS TO THE PROGRAMME: FINALISING

'LETTERS OF COLLABORATION' (Facilitator: Cumming)

Formal letters of collaboration have been received from seven organisations so far and those who intend to continue to participate in the programme were urged to complete and submit the letter to David Cumming. The letter is a very simple, open letter expressing intent to participate in the programme in so far as resources of time, funds and staff allow.

A major purpose of the letters, apart from a formal statement of intent from the head of a participating agency, is that the letters can be shown to potential donors as evidence of commitment to the programme by a full range of government, university and NGO agencies in the three countries involved in the GLTFCA. Copies of the letters would be available to members to use in backing-up funding proposals should they need them.

9. NEXT STEPS AND NEXT MEETING

1. The proceedings of the meeting to be written up within the next month – David Cumming responsible.
2. One- to two-page summaries of presentations to be submitted by speakers to David Cumming as soon as possible if they have not already done so.
3. WG members interested in participating in the scenarios planning effort discussed by Michael Murphree should contact him over the next few weeks.
4. Power-point presentations will be on Mike Kock's computer and on the web site if authors agree to their presentations being on the web site. A useful means of providing some protection against plagiarism is to print 6 slides per page in PDF format. [Note- all PP presentations received for this purpose have since been posted as PDFs at http://www.wcs-ahead.org/gltfca_march2006/agenda_march2006.html -ed.]
5. Volunteers for the Steering Group to indicate their intentions to David Cumming within the next two weeks. PPF to evaluate funding possibilities.
6. WG members are kindly requested to pay particular attention to Appendices 2 and 4 of these minutes- please let David Cumming know of any additional projects / project-related details that should be listed. Thank you.
7. Next meeting to be held in Zimbabwe if at all possible and preferably in the South East Lowveld. September / October possible time-frame.

The meeting closed at 13.30 and Danie Pienaar thanked everyone for their input. He thought it had been an interesting and stimulating meeting that had covered a wide range of appropriate topics. He extended thanks on behalf of the delegates to those who presented papers, to Steve Osofsky and Olivia van Melle Kamp and WCS for convening and funding the meeting, to David Cumming for his facilitation and to Merle White and Jackie Deacon for their, as always, excellent organisation and logistical arrangements.

APPENDICES

APPENDIX #1: LIST OF PARTICIPANTS

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APPENDIX #2: PROJECTS SUMMARY TABLE – UPDATED 10 MARCH, 2006

AHEAD-GLTFCA – Programme: Outline of Themes and Modules and summary of concepts being developed or suggested.

Theme	Module	Potential research proposal/Activity	Lead Agency/person respon.	Status	Potential Donor
#1 Overarching conceptual framework to facilitate integrated and inter-disciplinary approaches	a) Coordination and project start up	1. Support for the coordination and development of the AHEAD-GLTFCA programme	WCS/ Osofsky	Outline proposals developed	WCS
	b) Development of inter-disciplinary frameworks and models	1. Develop conceptual models to link the six programme themes through a series of meetings/workshops involving full range of researchers/disciplines and stakeholders in the GLTFCA	WCS/CASS Cumming / M. Murphree	Initial funding secured for framework and scenario planning	USAID/WCS
		2. Furthering TFCA scholarship (open for further discussion) ? NSF grants, Ford Foundation support to MSc. Students,, UCN/PLAAS short course . TPARI. Scholarship funding? Pick up on baseline indicators	CASS Inst. Nat. Res. Centre Environ. & Development.	Initial note from CASS	
	c) Baseline indicators	1. Participatory surveys of animal and human diseases, livelihoods and socio-economic baseline data in communal areas of the GLTFCA (Part of module 1(a)1?)	WCS Cumming/Osofsky	Initial concept and budget by WCS	
#2 Animal health and disease	a) Epidemiological studies	1. BTb, FMD and Brucellosis in Sengwe Communal Land Zw.	Vet Wildl. Unit, Zw/ Foggin	2000 cattle sampled – none +ve	PPF
		2. Status of BTb, FMD and Brucellosis in Limpopo National Park Will be done this year Ongoing work in KNP testing vaccines Kruger: Ongoing work on BTb in Buffalo, Kudu, lion, leopard, hyaena and giraffe and testing of vaccines	DINAP / Pereira / Roy Bengis / Markus Hofmeyr	Initial note Ongoing research and surveillance	PPF
		3. Serological studies of FMD, etc. in wild and domestic ungulates in the GLTFCA (Links to Theme #4 need to be built in and be explicit + link to a development NGO?)	OVI Vosloo et al. Will be revisited	Project concept	
		4. BTb and zoonotic implications	OVI / Michel	Project Concept Needs further development	
		5. Coordinating pathological data/sample analyses in GIS database in Mz	Rosa Costa / Mary-Lou Penrith	Project Proposal developed	Part of WB TFCA Project?
		6. Monitoring of tsetse in TFCA and linked to research on tsetse resurgence in Kwazulu-Natal (also development of SA policy on tsetse control)	Potgieter	Follow up with EU (v.d. Bosche) on monitoring in GLTFCA	?EU
		7. BTb data base from MRI work	MRI / Wayne Getz / Claire Geoghagan / Elissa Cameron	Programme continuing but requires new funding cycle	Proposal submitted to PPF
	b) Alternative animal health management and disease control strategies	NOTE: No concepts yet Primary health care measures, Cultural practices and indigenous knowledge, links with epidemiological studies, community based strategies	Mike Kock / Carlos Pereira	Proposal being developed for submission to Fondation Ensemble	

Theme	Module	Potential research proposal/Activity	Lead Agency/ person respon.	Status	Potential Donor
	c) Preventative/proactive measures in disease control and management	1. SOPs/Contingency plans/Risk assessments/Scenarios for priority diseases (e.g. Distemper) as a way of helping to define research and management priorities. (?Alien invasions!) – links to National Depts., Joint MB – Vet & Wildl. Committee)	Raath Starting with baseline GIS work and developing a template	No Progress or concept developed	
		2. BTb risk assessment in GLTFCA – PhD study proposal developed and submitted via CIRAD for support	Alex Caron	Proposal developed	CIRAD
	d) Theoretical/fundamental studies (Needs further development in terms of key or strategic additional studies/ideas)	1. Examining the relationship between social structure and the spread of diseases in ungulates and viverrids using modeling approaches and empirical data from general sampling of disease presence in a range of species in these groups. (also question of Brucella in small ungulates)	?	Initial note by Paul Cross – no further development	NSF
		2. Spatial models of disease risk between KNP and Mozambique using village livestock and wildlife densities and also examining the risks of diseases spreading from dogs to wild carnivores	?	Initial note- Cross cannot continue (new job)	NSF
		3. Study of tick-host-pathogen ecology at several spatial and temporal scales involving wild and domestic ungulates and humans. A key area of focus would be on determining thresholds of transmission and how these may vary under differing management regimes.	Cumming GS WEC/UFL	Initial note	
#3 Landuse, ecosystem goods and services & animal health	a) Spatial and temporal relationships between ecosystem processes and disease prevalence	NOTE: No concepts yet Requires remote sensing studies linked to epidemiological work in Theme #2 Climate change and cycles in relation to disease spread and prevalence			
	b) Landscape level resource use and impacts by wild and domestic ungulates on ecosystem goods & services	NOTE: No concepts yet Requires remote sensing studies and detailed ground survey work at appropriate scales e.g. impacts of elephant damage, overgrazing, trampling on run off, nutrients, water, non timber forest products	INR?		
	c) Effects of landuse scale and pattern on animal health	NOTE: No concepts yet Requires links between 3a & b and 2a. <i>What minimum sets of data are needed?</i>			
	d) Linkages between animal and human health	1. Disease risk assessment of people living in villages in the TFCA	Follow up on LNP Survey by Raath and Pereira	?	
		2. What happens when fences are taken down in the wake of dispersal of wildlife from NP and vice versa for livestock dispersal (also linked to water distribution)?			
		3. Public health implications of establishing the GLTFCA	Simpson	Proposal	
	e) Understanding animal husbandry practices	1. Role of livestock in household production, community differentiation, collective management and institutional factors affecting these	INR	Being reworked	
		2. Mike's concept + ARC projects and related projects			

Theme	Module	Potential research proposal/Activity	Lead Agency/ person respon.	Status	Potential Donor
#4 Human livelihoods, animal health and ecosystem goods & services (Ecosystem health)	a) Scenario planning and participatory exploration of land use options	1. Scenario planning and modeling at local community and village levels and developing approaches and methodology for "local adaptive scenario planning" – a 5 yr programme at least.	CASS + INR Manjengwa / Murphree MJ / Murphree MW	Funded	IDRC + USAID / WCS & SCF
		2. Issues of larger scale landuse planning, placement/removal of fences etc. (Biosphere Reserve concept for SEL of Zimbabwe?) (Need for spatial info. and remote sensing data/interpretation)	WWF-SARPO R. du Toit +CIRAD/NPWMA	Feasibility study in May 05 – Done. Extended TFCA concept now being examined	CIRAD
	b) trade offs between alternative landuse enterprises	NOTE: No concepts yet but could form part 4(a)2 above on biosphere reserve concept			
	c) Effects of alternative policies on development, adaptability and resilience	NOTE: No concepts yet			
#5 Policy support and capacity building	a) Support for policy development on animal health and linkages between animal and human health and ecosystems	Reviews of existing policy, seminars and training workshops in policy analysis	?	Initial concept and budget developed by WCS	
	b) Exploring consequences of alternative policies using scenarios	See 5(a)1 above Scenario planning workshops Urgent need in Zw – scenarios and use of scenes from remote sensing	INR Mike Murphree RdT and MM		
	c) Capacity building in policy analysis	See 5(a)1 above			
#6 Communications and outreach	a) Communication between research workers and agencies engaged in the programme	1. Series of workshops and seminars	WCS (See also Theme #1)	Concept and budget developed	Partial support USAID / WCS grant
		2. Web portal for communication among researchers / members of Working Group	Louis van Schalkwyk	Being implemented	PPF
	b) Information flow between scientists and Govt. and implementing agencies and policy making agencies	Workshops and seminars and meetings Development of website and database for results.	WCS & CASS PPF GIS initiative		
	c) Participation of landowners, communal farmers etc. in the programme & information flow	NOTE: No specific concepts yet CASS IDRC effort related?			
	d) Production and distribution of research results, syntheses, policy briefs, etc	NOTE: No specific concepts yet			

Theme	Module	Potential research proposal/Activity	Lead Agency/ person respon.	Status	Potential Donor
	e) Community and Village outreach including theatre linked to PRA	Transfer of information and research findings to communities and feedback on their views, perceptions and needs	Kock & Theatre for Africa + INR	Concept note	

APPENDIX #3: AGENDA FOR THE 6TH WORKING GROUP MEETING**6th AHEAD-GLTFCA Working Group Meeting
9th – 10th March, 2006****Venue: Pestana Kruger Lodge, Mpumalanga, South Africa (outside Nelspruit, near Kruger's Malelane Gate)**

NOTE: The focus of this meeting is “Current Science, Development and Policy Needs in the GLTFCA”- discussion papers on key research and development problems in the GLTFCA. Presentations should be approximately 20 minutes, with the remainder of the time allotted for a given topic being available for discussion. These sessions are meant to better define core problems identified, encourage interdisciplinary discourse, and perhaps lead to the development of additional proposals by consortium members to support identified critical needs. *Listed presenters are kindly asked to prepare a two page summary ahead of time and circulate these and any additional material before the meeting or at least have it ready at the start of the meeting. Thank you in advance for your time and contribution.*

Day One: Thursday 9th March

- 0900 Welcome** (Carlos Lopes Pereira, Chair Danie Pienaar)
- 0905 Introductions- around the room
- 0915 Brief introduction to *AHEAD* and background (Steve Osofsky, Mike Kock)
- 0920 Objectives and format of the 6th Working Group Meeting (David Cumming)
- 0930 “An Introduction to Complex Systems thinking and research [*Complex adaptive systems 101*]” (Harry Biggs)
- 1030 Tea/Coffee break**
- 1045 “Developing conceptual frameworks, models and linkages between themes and modules for the *AHEAD-GLTFCA* programme” (David Cumming)
- 1145 “Introduction to ‘Scenarios’ process and plans for year 1 with Sand County Foundation, USAID, and WCS support”; group reactions / discussion (Michael Murphree)
- 1300 Lunch**
- 1400 Brief informal presentations / updates by proponents of concepts / projects submitted so far and discussion (Facilitator: Cumming)
- 1530 Tea/Coffee break**
- 1545 “Animal disease threats and priorities in the GLTFCA- a JMB Conservation & Veterinary Sub-Committee perspective on ‘real world’ relationships between management / policy decisions and research” (Roy Bengis, *Chris Foggin [unconfirmed]*)
- 1635 “BTB and the livestock/wildlife/human interface- experiences in KwaZulu-Natal” (Claire Geoghegan, Wayne Getz)
- 1655 “Report on the Sengwe Communal Land BTB Survey” (Lisa Marabini, Keith Dutlow, *Chris Foggin [unconfirmed]*)
- 1715 “BTB roundtable update on current research, major findings, unanswered questions and research plans / priorities in the GLTFCA” (Wayne Getz, Markus Hofmeyr, Nick Kriek, Anita Michel, Roy Bengis, Carlos Lopes Pereira, Lisa Marabini, Keith Dutlow, *Stuart Hargreaves [unconfirmed]*)

- 1800** Brief review of progress, outline of tomorrow's programme and break for evening (Facilitator: Cumming) **Adjourn for dinner (dinner at Pestana provided by WCS)- Please come back for Day 2!**

Day Two: Friday 10th March

- 0830** "FMD epidemiology and research needs in the GLTFCA" (Wilna Vosloo, Gavin Thomson)
- 0900 "Tick borne diseases: some perspectives and research opportunities in the GLTFCA" (Graeme Cumming)
- 0945 "Databases and GIS for the GLTFCA: a resource available to the programme" (Louis van Schalkwyk)
- 1030 "Socio-economic research in the GLTFCA - a review of recent work, gaps and priorities" (Anna Spenceley, Daniel Marnewick and Conrad Steenkamp)
- 1115 Tea/Coffee break**
- 1130 "Rural development and ecosystem health in the GLTFCA - current issues and research and management needs" (Giuseppe Daconto)
- 1230 Project development in the pipeline – IDRC, Fondation Ensemble?, MacArthur (climate change)?, British Ecological Society, others? (David Cumming, Steve Osofsky, Mike Kock, Harry Biggs, Markus Hofmeyr, group)
- 1245 Proposal for a core AHEAD GLTFCA steering group (presenters: Biggs / Hofmeyr / Kriek / Kock / Osofsky others as available) and discussion (Facilitator: Cumming)
- 1300 Institutional commitments to the programme: finalising "letters of collaboration," etc. (Facilitator: Cumming)
- 1315 Next steps, actions and responsibilities (Facilitator: Cumming)
- 1330 Next meeting- when, where, and seeking a volunteer host? (Facilitator: Cumming)
- 1345 Thanks and closure (lunch provided)**

March 9, 2006 version

APPENDIX #4: LISTING OF RESEARCH PROJECTS IN THE GLTFCA & PROJECTS RELATED TO THE AHEAD-GLTFCA PROGRAMME

(NOTE: This is preliminary draft that was prompted by Fred Potgieter's interventions at the 6th Meeting – if any members can provide additional projects that should be included in the list please let me have the relevant information – David Cumming)

Project Title	Researchers	Years	Contact Person
<i>Onderstepoort Veterinary Research Institute / Agricultural Research Council, South Africa</i>			
1. Survey to determine whether the current boundaries of the African swine fever control zone are relevant to ensure safe pig farming for small scale farmers who cannot afford to comply with the regulatory requirements within the control zone	A. Lubisi, W. Vosloo, R. Dwarka, N. Mtshali, D. Seminya, T. Luthuli	2004-2005	
2. African swine fever virus: Development of vaccines and epidemiological investigations	W. Vosloo, A. Lubisi, R. Dwarka, L. Dixon	2005-2009	Wilna Vosloo vosloow@arc.agric.za
3. Molecular Epidemiology of African Swine Fever	RM Dwarka, N Mtshali, BA Lubisi, D Semanya, W Vosloo	Continuing	
4. Molecular Epidemiology of Foot-and-Mouth Disease	RM Dwarka, N. Mtshali, B. Botha, J. Esterhuysen, W Vosloo	Continuing	
5. Epidemiology of animal trypanosomiasis in KZN	Abdalla Latif, L Ntantiso, J Esterhuizen, F Majiwa	2005-2008	
6. Development of a policy for tsetse and trypanosomiasis monitoring, surveillance and control in KwaZulu-Natal and the Great Limpopo Trans Frontier Park.	K. Kappmeier Green, A. Latif, F.T. Potgieter, J.R. Esterhuizen, N. Sishuba, R. Bengis, L. Ntantiso, D. Mtshali, R.J. Bagnall, P. van den Bossche	2006-2009	
<i>Mammal Research Institute, University of Pretoria</i>			
1. BTB in Hluhluwe- Umfolosi	C. Geoghegan, W. Getz, M. Robertson	2005-2008	Claire Geoghegan cgeoghegan@zoology.up.ac.za
<i>Kruger National Park, SANParks, South Africa</i>			
1. Kruger – 200 + research projects in the park			
- BTb bi-annual survey			
- BTb Vaccination project			
- Comparative study of infected and non-infected lion populations			
- BTb Molecular epidemiology			
- BTb in Kudu			
- Passive surveillance			

Project Title	Researchers	Years	Contact Person
- Development of Btb diagnostic techniques for pachyderms			
- Diagnostics for theileriosis			
- Continuing surveys of a range of diseases in KNP			
- Genetic studies of buffalo			
Department of Veterinary Services, Zimbabwe			
1. Survey of bovine tuberculosis, brucellosis, FMD and trypanosomiasis in the Sengwe Communal Land, Zimbabwe	L. Marabini, K. Dutlow, C. Foggin	2004- ??	Veterinary Services, Zimbabwe/PPF
2. Tsetse surveillance and monitoring			
3. Incidence of FMD in kudu and impala			
Veterinary Services, Mozambique			
1. Monitoring BTb, brucellosis and FMD			
2. Ongoing data processing and analysis of the incidence of diseases in Mozambique using the TAD-info programme developed by FAO			
3. Tsetse surveillance and monitoring			
12 Malilangwe			
13. Gonarezhou fire			NPWLMA/ TREP
14. Save Valley Conservancy			
TPARI			
CASS/INR			
Etc., etc.			

**South East Lowveld Collaborative Research
(SELCORE)
Programme**

**Proceedings of the 5th SELCORE Workshop
Hakamela Camp, Malilangwe, Chiredzi, Zimbabwe
20-21st July, 2006**

Compiled by:

D. H. M. Cumming

Tropical Resource Ecology Programme, University of Zimbabwe

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Acknowledgements

Costs of accommodation and allowances for the participants in this workshop were supported by a grant from the Sand County Foundation and David Cumming's participation was supported by WCS through the AHEAD-GLTFCA programme.

The workshop was chaired by Abraham Sithole and facilitated by David Cumming. Meg Cumming kept a record of the meeting and discussions, and Raoul du Toit kindly made his notes of the workshop available. Thanks are also due to Melodie Mudapakati and WWF-SARPO for providing pin boards and associated materials for the workshop and to TREP for the use of one of their vehicles.

Abbreviations and Acronyms

AREX	Department of Agricultural Research & Extension
CASS	Centre for Applied Social Sciences
CESVI	CESVI Co-operation and Development
DDF	District Development Fund
FMD	Foot and Mouth Disease
IES	Institute for Environmental Studies
RDC	Rural District Council
SEL	South East Lowveld
SELCORE	South East Lowveld Collaborative Research Programme
SES	Social-ecological systems
SWOT	Strengths, Weaknesses, Opportunities and Threats
TREP	Tropical Resource Ecology Programme

Apologies:

Apologies were received from Professor Sara Feresu, Mike Jones, Bruce Clegg, and Giuseppe Daconto.

1. OPENING REMARKS

ABRAHAM SITHOLE (Chair of the SVC-RDC Joint Committee and Workshop Chair)

Firstly, on behalf of the local authorities I would like to welcome all of you to the 5th SELCORE Workshop. It is now well over a year since the last workshop – why? There was a feeling that we had had enough of workshops and needed to start seeing results on the ground. Those doing research have no problems with continuing research projects but communities want results and change and not just research. I am, however, pleased that the SELCORE initiative is now being revived. The South East Lowveld has taken the lead in wildlife development in Zimbabwe. However research and the development of wildlife without taking into consideration the improvement of ordinary peoples' livelihoods will not take us anywhere. It is clear that crops and livestock production will remain an important part of livelihood strategies in the SEL and will also need attention.

In our previous workshops we agreed that it was important to have tangible results on the ground. Researchers are comfortable simply producing research results but as communities we need results that are integrated with development and the most urgent need in the Lowveld is to improve livelihoods. It is also important that the future development of the TFCA takes this issue into account in its planning and implementation. There are many problems to be faced but we need to take these as challenges. If we do not tackle these problems ourselves nobody else will do so for us.

CLIVE STOCKIL (Chair – SVC)

The theme of my talk will be “Yesterday, today and tomorrow” in the context of SELCORE. It is important to appreciate that we are engaged in a process.

Yesterday is as much a part of the story as today and we need to reflect on a little story called, “We must keep the flame burning”. Fifty years ago when I was a small boy I was travelling on a camping trip to the Gonarezhou with my father. My father said it was important that we reached our destination before dark and I was at an age when one had to ask “why”? Why, did we have to get there before dark? My father replied that it was because we had to collect firewood before it gets dark. Why did we have to collect firewood? We needed to collect firewood to make a fire. Why did we need to have a fire? We needed a fire to cook our food, and because the flames would keep us warm and keep the lions away and, if we slept downwind of the fire, it would keep the mosquitoes away. We needed enough wood to keep the flame burning through the night. SELCORE has kept the flame burning and we must now tackle the challenges before us. There is no blueprint other than what we plan for ourselves.

Today we need a group of committed stakeholders and we need unity to face the many challenges to be tackled in developing the wildlife industry and the South East Lowveld. Our forum here is at the cutting edge of sustainable development but we need to build something bigger than just research – SELCORE is a cornerstone of a much bigger picture. The TFCA creates opportunities as well as conservation and social challenges. Solutions need to be found, tested and proven. We can't do it alone and must recruit allies and build a team. In

order to accomplish that we require a positive and constructive awareness of the whole project – the bigger picture. We in this room may have a clear vision but we need to take that to a much broader range of stakeholders who need to be informed and taken on board. Positive interventions from higher levels and from elsewhere will not happen. The future lies with the people in the SEL and it starts here.

Tomorrow calls up the question of how to move forward. We are a group of stakeholders with similar goals and we need to formulate a plan and remain focused, committed and united, and one way to achieve these objectives is to establish a forum that brings all of the stakeholders together, to lead eventually into something bigger. SELCORE can play a role in the bigger picture in helping to identify the opportunities and the social challenges to which solutions must be found – solutions that will benefit all of the people of the Lowveld.

We need a road map, need to recruit allies and develop a shared vision amongst all of our stakeholders. One idea is to recruit a team and develop a positive vision of the whole project in its entirety, and also to develop an awareness of the potential in a broader group of stakeholders. Aldo Leopold, author of “A Sand County Almanac”, was a champion of his time and used the power of the pen to contribute to sustainable development. Means of communication have since changed and we need to get our message across in modern media such as “Discovery” and “National Geographic” television channels in a series of programmes that will highlight our successes. These include rhino and wild dog conservation and the development of a new IPZ in Gonarezhou NP, conservation awareness programmes, and so on.

Today we are a few people sitting in the SEL but this is an initiative of global importance and we have to do it ourselves – we have to keep the flame burning.

INTRODUCTIONS

Participants introduced themselves and gave their affiliations and, in some cases, their interest in the workshop. The list of participants and their contact details are provided in Appendix 1.

2. REVIEW OF PREVIOUS SELCORE WORKSHOPS

The SELCORE programme had its origins in earlier attempts to establish a coordinated research programme to serve the natural resource management needs of a rapidly developing wildlife and tourism industry in the SEL. During the late 1990s the possibility of establishing a research institute to service the SEL was also examined. When it became clear that resources to do so were unlikely to be available, a review of previous research and attempts to establish a research programme concluded with a proposal to establish a collaborative research programme that involved three research units at the University of Zimbabwe, two conservancies and five Rural District Councils.

The inaugural meeting of SELCORE was held at Senuko in January 2003, when agreement was reached and an MOU signed, to establish a collaborative research programme in the South East Lowveld (SEL). A small grant from the Resilience Alliance allowed four workshops to be convened to consider the research and information needs of the various

stakeholders in the SEL.

The 1st SELCORE Workshop was held at the end of May, 2003. It provided an opportunity for the major participants in the collaborative programme to introduce themselves and outline their primary interests in the collaborative programme. The workshop focused on examining natural resource management issues relating to the three main land use sectors in the SEL, namely, small-scale agro-pastoralism, wildlife and tourism, and large scale irrigation. Cross-sectoral issues were also examined in working sessions. It was agreed that follow-up workshops should take place and that these should, at least initially, focus on particular sectors and that the next workshop should concentrate on the wildlife/tourism sector. A SELCORE committee comprising representatives of the signatories to the MOU was appointed.

The 2nd SELCORE Workshop was held in August, 2003, and the following aspects were covered:

- An “Objectives tree” for the programme, which emerged from the objectives of the programme as enunciated in the MOU and the deliberations of the 1st Workshop, were discussed and the Goal, Purpose and major Outputs for the programme were agreed. The committee chair was tasked with fleshing this out in greater detail.
- Major issues facing the wildlife/tourism sector in the SEL were discussed at some length after a stimulating presentation by Mr. D. de la Harpe.
- The strengths and weaknesses of current and potential wildlife/tourism areas and related developments in the SEL were examined and partially mapped in a series of plenary working sessions.

Some objectives of the 2nd Workshop (e.g. developing a conceptual framework of how the sector operated in the SEL and alternative scenarios for how the sector might develop) were not covered and it was agreed that these should be tackled at the next workshop in November, 2003.

The 3rd SELCORE Workshop was held in November, 2003. Existing and potential wildlife areas were reviewed, and visions and scenarios for the future and a biosphere reserve concept for the South East Lowveld were examined. The workshop then covered the following topics: (a) the wider contribution the SELCORE programme might make to development; (b) a conceptual framework for the wildlife and tourism sector; (c) the programme objectives tree, and (d) an action plan. It was agreed that the 4th Workshop should examine issues relating to water and irrigation.

The 4th Workshop was held in December 2004 and covered the water and the irrigation sector and how this linked to the other sectors. A key aspect considered at the workshop was the development of a project proposal for submission to the European Union in response to a recent call for proposals related to water conservation and management. A proposal was developed and submitted by CESVI with CASS, IES and Triangle Ltd as partners. The proposal passed the first round of selection but, unfortunately, the requirements were changed for the second round of selection and for various reasons it was prudent to withdraw the proposal. Consideration is presently being given to revising and resubmitting the proposal with a direct focus on developing the links between large and small scale irrigators and out-grower schemes.

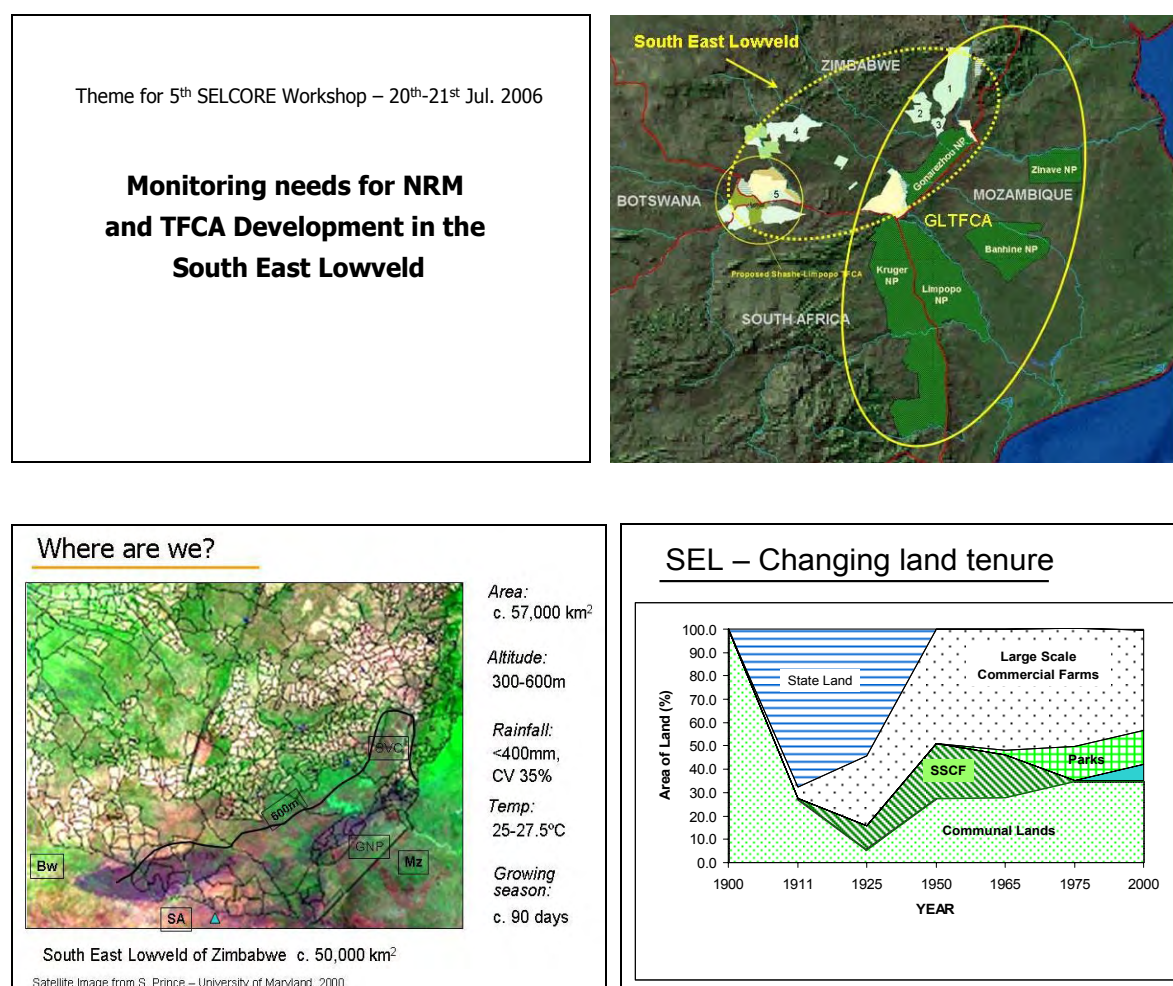
This, the 5th Workshop, is aimed primarily at considering the needs for monitoring

programmes in the development of the Great Limpopo and Shashe-Limpopo Transfrontier Conservation areas following a request for SELCORE to do so by the National TFCA Conservation and Veterinary Sub-Committee. The meeting is also due to deliberate on, (a) the renewal of the SELCORE MOU signed in January 2003, (b) the extension of membership to include Mwenezi and Beitbridge Districts, and (c) the formation of a wildlife forum to assist in the development of the wildlife industry in the SEL.

There are also several new and potentially overlapping research and development initiatives in the South East Lowveld and it would be useful for the workshop participants to be briefed on these and to examine how best these activities can be coordinated so as to achieve maximum synergy and benefits to the Lowveld

3. MONITORING NEEDS OF THE SEL IN RELATION TO THE TFCA

The following slide presentation by David Cumming provided an introduction to the theme of the workshop.



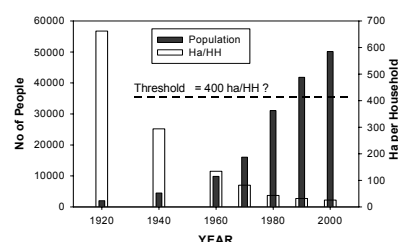
Where are we?

Land tenure in SE Lowveld - 57,000 km²

Land category	% of Area	People/km ²
Communal Land	44.2	11 - 52
Large-scale C. Farms - irrigation	<0.01	?
Cattle ranches	16 ?	< 3
Wildlife + cattle	9	< 3
Conservancies	13	< 3
Small-scale Commercial Farms	0.5	<10
Resettlement land	5.6	?
Parks & Wildlife Estate	11.1	<1

- Population of about 680,000 or an overall density of c. 12 per km² or 50ha per household
- Very high proportion (80%?) of people are living below poverty datum line
- HIV infection rate of >20%

Small-scale Agro-pastoralism – farm size e.g. Matibi II



Land required per HH with minimum external inputs:

- Access to 20 ha arable (5 year rotation of 4ha)
- c. 400 ha of grazing land to maintain a herd of 25 cattle and 35 goats

➔ By 1940 land available per HH was less than required

Some Key Considerations: WATER SECTOR

- Low rainfall and low run-off (<5% of regional mean)
- Coefficient of variation in runoff 135%
 - ➔ Highly dependent on water from the highveld
- Quality, quantity and discharge patterns depend on land management in the upper catchment
 - ➔ incentives for landowners to "produce" and conserve water may be vital to long term sustainability
- Irrigation plays a central role in landuse in the SEL by allowing the development of agricultural intensification and agro-industries on suitable soils
- Important at scales varying from bucket irrigators to large scale commercial operations
 - ➔ Care of soils critical for sustainability

Water Sector - Implication for monitoring?

- Water supply
- Extent and patterns of use
- Water quality and nutrient loads
- Soil nutrient status

Further information needs?

- Costs/benefits and trade offs of alternative uses
- Ground water reserves and sustainability
- Ecosystem requirements

Some Key Considerations: AGRO-PASTORAL SECTOR

A. Livestock and livelihoods

- Variable rainfall and grazing resources
- Marketing (currently depressed industry)
- Diseases and wildlife conflicts
- Elephants and habitats

B. Dry land Cropping

- Growing season variable and short
- Production seldom meets H/H needs
- Nutrient status of fields declining?
- Wildlife conflicts and pests

Agro-pastoral Sector - Implication for monitoring?

- Human-wildlife conflict and impacts on H/H food security
- Livestock diseases and their impacts on production
- Markets and prices –livestock and crops
- Rangeland condition

Further information needs?

- Costs/benefits and trade offs of alternative land uses
- Trends in nutrient status of crop & grazing lands

<p><u>Some Key Considerations: WILDLIFE & TOURISM</u></p> <ul style="list-style-type: none"> • “Wild Land” , infrastructure & facilities • Range of wildlife species & viable populations • Conflicts with neighbouring land uses • Diseases <p><u>Implications for Monitoring</u></p> <ul style="list-style-type: none"> • Extent of wildlife land and landuse change • Wildlife populations, offtakes, trophy quality • Infrastructure and facilities • Disease issues • Wildlife conflicts and pests 	<p><u>General Considerations:</u></p> <ul style="list-style-type: none"> • Resources • Sustainability • Who will use the information • Feedback and impact on management
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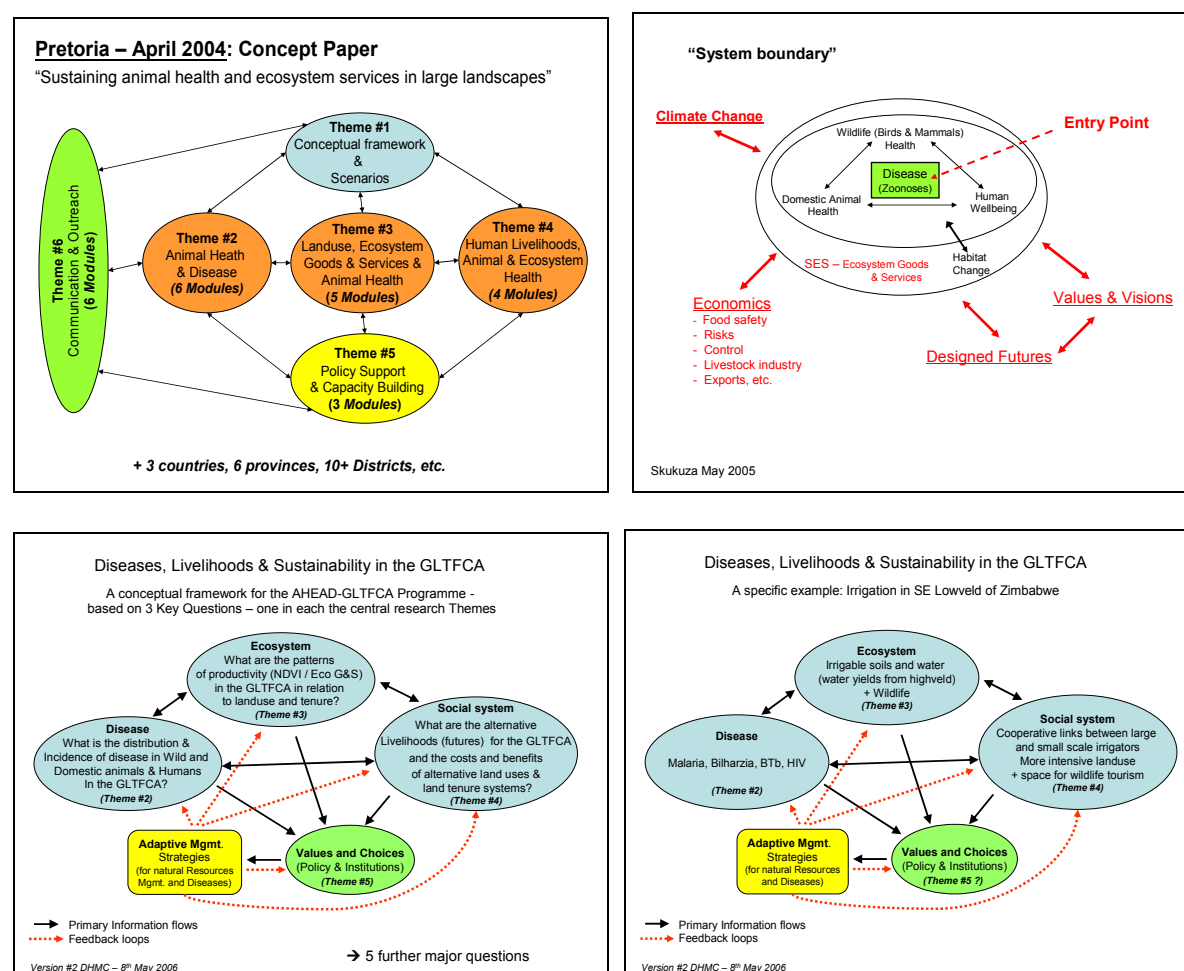
Some additional points, made during the presentation and subsequent discussion, were as follows:

1. The lowveld depended on water from the high- and middle-veld but there were no incentives in place to better manage catchments to yield water that was vital to the lowveld.
2. The last SELCORE workshop had resulted in a proposal to examine water use in the Rundi catchment and to develop pilot irrigation schemes that linked large and small scale irrigators. The proposal passed the first round but did not fit revised criteria for the second round. The proposal will probably be revised and resubmitted this year.
3. There is good evidence that sub-Saharan Africa is mining its nutrients at an alarming rate. There is the likelihood that nutrients are being depleted in both arable and grazing lands in the SEL.
4. The development of wildlife-based tourism requires ‘wild land’ including the big five and inevitably results in conflicts with neighbouring agricultural production. The changing patterns of land use that have occurred over the last six years are not reflected in the graphs and data presented above and there is a clear need to monitor the changes that have occurred and are occurring. In addition, there is a need to monitor population trends, offtake, trophy quality, infrastructural development, diseases and human-wildlife conflicts and problem animal control.
5. A key feature of monitoring, if it is to be useful, is that it should feed back to resource managers in a timely and useable manner so that it can be used in reaching resource management decisions.
6. In response to a question about 400 ha being required per household it was noted that this was what was required if households were to be self sufficient and not have to rely on external inputs in the form of off-farm labour and wage remittances from the cities.
7. Comparable forums where conservancies and local communities represented by their RDCs, examined and discussed research and development needs did not appear to be present in neighbouring countries. The fuller development of the AHEAD-GLTFCA programme did, however, envisage such linkages being developed across the TFCA. The Wits Rural Facility carried out detailed work in ‘developing areas’ in the lowveld in South Africa but was not regional.

4. BRIEF PRESENTATIONS ON CURRENT RESEARCH & DEVELOPMENT ACTIVITIES AND THE NEED FOR COORDINATION

4.1. The AHEAD-GLTFCA programme (David Cumming)

The presentation gave a brief outline of the background and conceptual framework of the AHEAD-GLTFCA programme which had its origins in a forum convened by the Field Veterinary Program of Wildlife Conservation Society and several other agencies. The forum included about 100 participants comprising mainly veterinarians, ecologists and sociologists. The central focus of the programme is the interface between wildlife-livestock-human diseases and the linkages to ecosystem health and human livelihoods in the GLTFCA.



Diseases, Livelihoods & Sustainability in the GLTFCA

A conceptual framework for the AHEAD-GLTFCA Programme -

Five major questions

1. What types and pattern of landuse and tenure will enhance system health*, productivity and resilience (sustainability) of the Social-Ecological System (SES) of the GLTFCA?
2. What is the state and trend of the five capitals in each landuse/and tenure component of the TFCA and how might these change (and influence health) under differing scenarios?
3. What are the biodiversity, environmental, social and economic trade offs/opportunity costs of alternative patterns of landuse
4. What are the levels of cross subsidy within the system?
5. What is the level of external subsidy to the GLTFCA system?

* 'Health' refers to wild and domestic animal health and human livelihoods – the disease component of the AHEAD programme.

Version #2 DHMC – 8th May 2006

4.2 CIRAD – Livestock projects and bovine tuberculosis study (Alexander Caron)

CIRAD is the French Agricultural Research Centre for International Development. The agency conducts applied research and has been working in developing countries, mainly in Africa for 40 years. CIRAD has seven departments one of which is the Dept. of Animal Production and Veterinary Medicine (CIRAD-emvt.)

CIRAD- Zimbabwe has a research unit “Wildlife Integrated Management” within the CIRAD-emvt which has been working in Zimbabwe for 10 years.

Projects Under development: *PCP* is a platform of research in partnership and includes four components:

- Ecology component (Hwange NP)
- Governance component (BioHub – Lowveld component)
- Conservation farming component (Lowveld component)
- Wildlife / Livestock Health (Lowveld component)

Livestock Lowveld Project:

This project is funded by the French Embassy and partners include the TFCA Conservation and Veterinary Sub Committee, Veterinary Services, the University of Zimbabwe Faculty of Veterinary Medicine and CASS

First phase: 6 months

Overall objective: investigate livestock production strategies and opportunities for small-scale owners as well as their attitudes towards wildlife issues.

Study site: Malipati Animal Health Centre and its 10 diptanks.

Methodology: Re-vitalising the functioning of diptanks, with interviews of the farmers attending the diptanks being carried out by one veterinary and one social sciences student

under the supervision of an experienced veterinary livestock inspector

Perspective: scaling up at the district level (around GNP) by donors.

Wildlife Lowveld Project:

This project is also funded by the French Embassy and involves a survey of the status of wildlife in the SEL (see presentation below by Alistair Pole)

Spatial Approach to assessing disease risk at the wildlife / livestock interface:

A PhD study to be conducted by Alexander Caron under the auspices of CIRAD but further funding is required for it to be fully operational.

4.3 CIRAD – Assessment of wildlife production in the South East Lowveld (Alistair Pole)

The French Embassy has provided a grant of Euro 15,000 for the project which is being coordinated by William Crosmar of CIRAD with Alistair Pole as the local consultant.

Objective: Classify the wildlife production potential of each of the major land units in the SEL on a scale from low to high.

Method: Information will be collected using a questionnaire comprised of two parts, (a) current status of wildlife and land use for each land unit, and (b) An extended questionnaire covering information on ecological, management, and utilisation issues. GIS will be used to analyse the land unit information and the extended questionnaire data will be subjected to statistical analysis.

The project will involve as much local involvement as possible.

4.4 CESVI – Limpopo TFCA Project

CESVI is an Italian NGO that has been working in Zimbabwe since 1998. At a national level CESVI has MOUs with the Ministry of Health, the Ministry of Environment and Tourism through the PWMA, and the Ministry of Labour and Social Welfare.

CESVI's activities in Zimbabwe take a regional dimension with the north eastern region focusing on health issues such as malaria, HIV and AIDS. In the South East Lowveld CESVI has, since 1998, been implementing a "Sustainable development and natural resources management" project mainly in Beitbridge and Chiredzi Districts. Activities have included the collection of field data to establish baseline mapping and data on rural infrastructure, human populations and institutions, vegetation, and wildlife populations.

CESVI has assisted Beitbridge and Chiredzi Districts and the Department of Physical Planning in providing information for the development of the Sengwe-Tshipise Wilderness Corridor linking Gonarezhou and Kruger National Park as part of the Great Limpopo Transfrontier National Park. This has involved assisting in the drafting of the Report of

Study and the Written Statement which are statutory requirements for the formal establishment of a local plan – in this case the establishment of the Sengwe-Tshipise Wilderness Corridor.

Since the beginning of 2005 CESVI has also been implementing a project entitled “Life skills and health education in South Eastern Zimbabwe”. This project is aimed at promoting the development of healthy schools through supporting the training of health workers and the construction of health facilities.

CESVI will soon be implementing a project entitled “Livelihood enhancement through transboundary natural resources management in the Limpopo Corridor”. This will be done in partnership with IUCN and counterpart agencies in Mozambique, South Africa and Zimbabwe. The three operational outputs of the project are:

1. Development of enabling policy frameworks for transboundary natural resources management (TBNRM) by communities facilitated.
2. Ecological, economic, and social advantages (value added) of TBNRM identified and interventions to realize value-added opportunities developed.
3. Targeted natural resource management projects in each of the partner countries implemented.

This is expected to be a three year project and it is due to start in the next two to three months.

4.5 CASS – Scenario Planning (Chaka Chirozva)

The Centre for Applied Social Sciences (CASS) (University of Zimbabwe) is pleased to announce that they have been granted funds by the International Development and Research Centre (IDRC), Canada for a five year project entitled “Local level scenario planning, iterative assessment and adaptive management”. The project will be implemented by CASS in collaboration with the Institute of Natural Resources, University of KwaZulu Natal, Pietermaritzburg, in rural communities in Zimbabwe, South Africa and Mozambique included in the Great Limpopo Transfrontier Conservation Area (GLTFCA). The project aims to enhance the collective ability of these communities to devise, implement, and adapt their natural resources management regimes so as to maximize the conservation and livelihood benefits they obtain from these and resources through the use of scenario planning. The process will also result in social learning, self assessment and adaptive management. The project is a module under theme four “Human livelihoods, animal health and ecosystem goods and services” of the AHEAD-GLTFCA project. Scenario modeling can improve GLTFCA planners’ understanding of the needs and aspirations of resident populations and enhance their influence in overall planning and implementation.

The first year of the project will consist of planning modalities, collaboration with other potential partners and identification of pilot sites in the three countries. Scenario modeling is a useful tool for this project where the emphasis is on longitudinal methodological experimentation and adaptive management. Stakeholders’ commitment is important for success of the project and the overall development of the South Eastern Lowveld within the context of the GLTFCA.

4.6. INR/AHEAD-GLTFCA – Scenario Planning (Michael Murphree)

Thank you for the invitation to attend this workshop. In their opening remarks Abraham Sithole commented on the endless research and Clive Stockil on the need to keep the flame burning and move forward. The question is how are we going to move forward? We have plans at local, ward, district and national level, regional plans and action plans and now we have scenario plans. Scenarios differ from other planning initiatives in that they attempt to cater for unforeseen circumstances, where we find that normal plans do not work. Scenario planning is about “what if ..” and involves environmental, social, economic, and political dimensions. It attempts to think through some of the likely or plausible “What ifs ...” that may come as shocks and surprises in an uncertain future. It is a process of rehearsing different kinds of futures. I was first exposed to the power of scenario planning in local situations when I was involved in scenario planning with Richards Bay Minerals in Kwazulu-Natal.

The Wildlife Conservation Society (WCS) through the AHEAD-GLTFCA programme has provided some funding for scenario planning in relation to the GLTFCA and further support has been provided by a grant from Sand County Foundation. The project is initially approaching scenario in individual countries and this preliminary visit to the SEL is to explore what people may want to do here. A meeting has been held in Maputo and another is planned for next month in Kruger National Park. The AHEAD-GLTFCA and Sand County initiatives link in to the local level scenario planning project that will be undertaken by CASS and INR.

4.7 Save Valley Conservancy

4.7.1 Save Valley Conservancy (SVC) – Technical Advisory Committee (Alistair Pole)

The SVC TAC is an open committee which has some external advisors. The TAC assists the SVC in development and management with a focus on trophy monitoring and surveys which are linked to adaptive quota setting. Accurate estimates are seldom obtained from wildlife censuses so there is a need for more adaptive approaches to managing quotas based on trophy quality. There is a developing elephant management problem. Five hundred and fifty elephants were introduced from the Gonarezhou NP in 1993 and there are now 1200 elephants in the SVC. Elephant impacts on woodland habitats are becoming obvious and there is a need to develop an elephant management policy. A land unit classification is presently being carried out that will help in the development of future plans and policies.

4.7.2 Research into the bushmeat trade in SVC (Peter Lindsey).

Project title: The bush-meat trade in Savé Valley Conservancy: developing tools to mitigate the causes for and negative impacts of the problem

Principal Investigators: S.S. Romañach and P.A. Lindsey (Research Associates at TREP)
Master's student from CASS for questionnaire surveys: Steven Matema

Three key objectives of the study:

1) Document the scale of the problem

We are attempting to document every incident of poaching on ranches within SVC, with which to:

- a) Estimate the minimum threat to wildlife populations
- b) Estimate the economic costs resulting from poaching
- c) To identify spatial and temporal patterns in poaching on order to focus anti-poaching efforts on a ranch by ranch and conservancy-wide basis

2) Establish a poacher database

We are recording the name, and where possible the ID number, gender and approximate age of each poacher caught, where she or he is from, and a record the number of times the individual has been caught before. We are also documenting the punishments imposed on convicted poachers. The purpose of this database is to:

- a) Identify the source areas for hunters coming into SVC so as to identify areas of key importance for community outreach efforts
- b) Determine whether the bush-meat trade in SVC is the result of large numbers of opportunistic hunters, or fewer repeat-offenders
- c) Provide a documented history of offences that can be passed onto the police when repeat offenders are caught
- d) To analyze the efficacy of punishments as deterrents against poaching

3) To identify underlying causes of the problem

We are in the process of conducting an interview survey of convicted poachers caught within SVC to obtain an improved understanding of the reasons why they hunt within SVC, and to identify steps that might be taken by the conservancy or other bodies to remove or reduce these causes. In addition, we intend to interview all of the game scouts working within SVC to garner their suggestions on steps that might be taken by SVC to tackle poaching. Finally, we are in the process of requesting permission from the Rural District Councils neighbouring SVC (Bikita, Buhera, Chipinge, Chiredzi and Zaka) to interview community members who purchase meat caught by poachers in SVC. With permission from the RDCs, a master's student from the Centre for Applied Social Sciences at the University of Zimbabwe (Steven Matema) will interview bush-meat buyers in the communities neighbouring SVC. The purpose of these questionnaires is to:

- a) Identify the extent to which poaching is done for subsistence or commercial gain
- b) Identify the trade routes for meat emanating from SVC
- c) Improve understanding of the modus operandi of poachers entering SVC
- d) Improve understanding of the socioeconomic and cultural causes for the bush-meat trade
- e) Improve our understanding of the steps that SVC could take to reduce the effect of the bush-meat trade through improved policing and by mitigating the underlying causes of the problem

On completion of this work, we hope to have documented the scale and impact of the bush-meat trade on wildlife populations in the conservancy, and to have made recommendations on how policing of the wildlife resource might be improved. Most importantly, we hope to make

recommendations on how the conservancy might improve outreach efforts with neighbouring communities with the objective of addressing the causes of illegal off-take.

Discussion: Colin Saunders reported that in a project on the western border of the Serengeti National Parks a helicopter patrol had recently found a large number of poachers' camps, one of which had 140 wildebeest carcasses ready for export to Kenya. Peter Lindsey added that there was enormous wastage in meat from poaching activities in the SVC with an estimated four impala going to waste for every impala that was collected. The result was that 5 impala only effectively generated the value of one animal, namely, Z\$4 million.

4.8 Triangle Ltd. – Water Resources (Angus Middleton)

The rationale behind investing in catchment schemes is to conserve catchments and guarantee water supplies to the SE Lowveld. The idea is to develop irrigation schemes that draw people from surrounding areas into more concentrated areas, thus creating conservation areas. These conservation areas should serve to improve catchment services.

Progress: A proposal to look at the development of community irrigation schemes was submitted in response to a call from the EU, with co-funding from Triangle and CESVI and CASS & IES as institutional partners. This passed the initial round but was withdrawn in response to a change in requirements.

More recently Triangle and CESVI have begun exploring opportunities for the rehabilitation of irrigation schemes in the Lowveld. It is hoped that this will form the basis of a larger Public Private partnership to meaningfully and sustainably rehabilitate schemes.

ZINWA has now established a Catchment Council for the Runde Catchment and progress is being made within the catchment on issues of water management and awareness.

Discussion:

1. Malilangwe has supported the construction of micro-irrigation schemes but a lack of transport and marketing arrangements undermines the commercial viability of the schemes. This keeps them at a subsistence level.
2. There is a need to develop partnerships between small scale and large scale producers to overcome these difficulties. There have been some exciting developments in the growing and marketing of paprika in Matebeleland. Triangle is interested in developing out-grower schemes to produce maize but national policies that require all maize to be sold to the GMB preclude this.

4.9 Regional Coordination – A Wildlife Forum (Raoul du Toit)

The following power point presentation was given by Raoul du Toit.

(Note: Agency logos, one map of the proposed realignment of the FMD fence, and two photographs, have been taken out in order to reduce the size of the file)

PROPOSAL FOR A LOWVELD WILDLIFE FORUM

by Raoul du Toit

RATIONALE:

Need for coordination amongst stakeholders in Lowveld wildlife industry, for:

- engagement with TFCA
- implementation of mutually supportive land reform plans for both these, development of viable PPCPs
- maintaining spatial scale and enhancing economic scale of wildlife-based land-use (FMD zonation, etc.)
- managing wildlife (restocking, destocking, disease control)
- locally based monitoring of key wildlife resources
- lobbying and influencing relevant policies and funding
- enhancing awareness and understanding (esp. communities)

THE PRECEDENT: Kenya

Laikipia Wildlife Forum Ltd

brings together all the different interest groups in the district who are involved in wildlife, including ranchers, pastoralists from the group ranches, representatives from the small farming communities, the government, the Kenya Wildlife Service and NGO's.

Registered as non-profit company
and includes:

- Lewa Wildlife Conservancy
- Kenya Wildlife Service
- Save the Rhino Trust
- Ecotourism in Kenya
- Mpala Research Centre

ISSUES TO BE CAREFUL OF:

DUPLICATION AND COMPETITION WITH OTHER INITIATIVES AND INSTITUTIONAL ARRANGEMENTS, E.G. TFCA COMMITTEES

LACK OF FUNDING TO MAINTAIN A SUSTAINABLE INITIATIVE

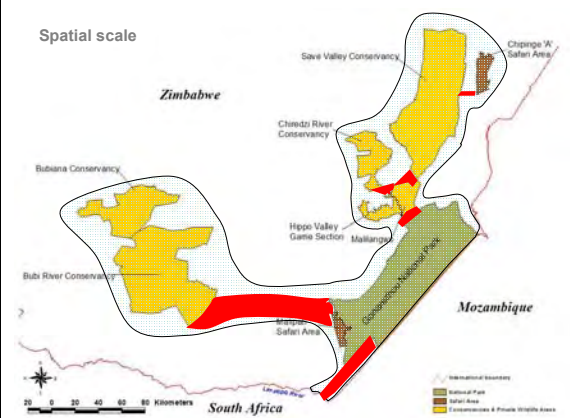
APPROACH

INITIATE THE LOWVELD WILDLIFE FORUM WITH A CLEAR FOCUS ON LOCALLY-BASED MANAGEMENT/MONITORING OF THE WILDLIFE RESOURCE BASE

MEMBERSHIP TO BE ENTIRELY VOLUNTARY - COMMERCIAL WILDLIFE OPERATIONS, COMMUNITY-BASED WILDLIFE OPERATIONS (RDCs), PPCPs

LOWVELD WILDLIFE FORUM MUST BE SEEN TO BE STAKEHOLDER-BASED, POLITICALLY NEUTRAL, NON-CONFRONTATIONAL, CONSERVATION-ORIENTATED, FOR DEVELOPMENT (NOT RESEARCH)

Spatial scale



GREAT LIMPOPO TRANSFRONTIER CONSERVATION AREA



SOME KEY ACTIVITIES

SPATIAL ANALYSIS OF WILDLIFE-PRODUCTION POTENTIAL (BASED ON KEY SPECIES AND CATEGORIES OF LAND COMPETITION)

FROM THIS, DEMARCATe RESERVOIRS AND CORRIDORS FOR BIODIVERSITY

FROM THIS, DERIVE AN INDICATION OF POTENTIAL NEW FMD ZONATION

UNDERTAKE PARTICIPATORY PLANNING OF NEW FMD FENCE

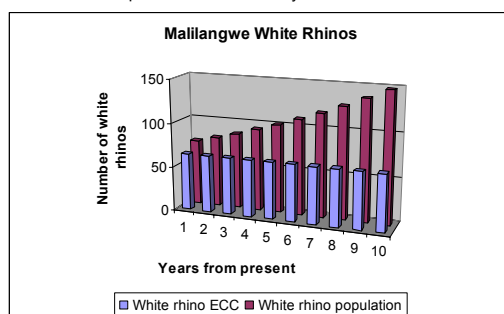
ESTABLISH A LOCALLY-BASED, COST-EFFECTIVE, SUSTAINABLE BIODIVERSITY MONITORING SYSTEM OF RELEVANCE TO STAKEHOLDERS' NEEDS (INCLUDING GONAREZHOU)

DEVELOP AND IMPLEMENT SPECIES MANAGEMENT PLANS FOR THE KEY SPECIES (SUBSUMING THE EXISTING BLACK RHINO LOWVELD METAPOPULATION PROGRAMME AND ESTABLISHING SIMILAR ONES FOR OTHER SPECIES)

SUPPORT THE WORKPLAN OF THE CONSERVATION & VET SUB-COMMITTEE FOR THE TFCA

INVESTIGATION AND PROMOTION OF BUSINESSLIKE RESOURCE-SHARING OPTIONS

Extension/amplification of community endowment scheme



Over the next 10 years, 83 "extra" white rhinos produced

Establish a "Lowveld Wildlife Exchange" to facilitate movement of wildlife from overstocked areas to understocked (but adequately secure) areas, under community endowment schemes, etc.
Develop game capture capacity?

Achieve linkage, within donor support for the TFCA, between the areas of wildlife production and the areas requiring destocking so that donor support for restocking creates incentives for producers.

Facilitate PPCPs and wildlife-based land reform through impartial professional advice: wildlife management, legal issues, economics

PROMOTE THE SELCORE RESEARCH AGENDA
With particular emphasis on livelihoods assessments and holistic land-use options for communities living within the Lowveld wildlife production zone

DEVELOP JOINT P&WMA MOBILE ANTI-POACHING REACTION UNIT

INVESTIGATE INTERNATIONAL PRECEDENTS AND LINKAGES
Australian Land Care system, Laikipia Wildlife Forum, etc.

DEVELOP OUTREACH/AWARENESS PROGRAMMES (PROBABLY SPECIES-ORIENTATED)

INVESTIGATE INTERNATIONAL PRECEDENTS AND LINKAGES
Australian Land Care system, Laikipia Wildlife Forum, etc.

DEVELOP OUTREACH/AWARENESS PROGRAMMES (PROBABLY SPECIES-ORIENTATED)

DEVELOP METAPOPULATION MANAGEMENT PLANS FOR KEY SPECIES

DEVELOP MOU WITH PARKS & WILDLIFE ON MONITORING AND MANAGING RHINOS IN THE LOWVELD

SIMILAR STEPS FOR BUFFALO....AND ELEPHANT ETC.

DEVELOP SUSTAINABLE FUNDING
GEF opportunities, Trust Fund, IFC intermediary role, etc.
US 501(c) (3) registration
Levies on producers: biodiversity monitoring, FMD fence (from buffalo quotas?)
Watershed management incentives?

Fideicomiso para la Conservación en Guatemala

Funded by Whitley Animal Trust, WWF, private US bank, IFC/GEF

Example of project:

Mesoamerican Biological Corridor: The MBC is a system of land use planning, formed by areas under special administration, such as protected areas of different categories, and interconnecting areas, that are established to provide environmental goods and services to the Central American and world society. On the ground, corridors are understood as the set of protected areas, sustainable use activities, and ecological restoration sites.

Fideicomiso para la Conservación en Guatemala

GEF BENEFITS:

- * Integration of biodiversity conservation and sustainable use objectives into land use.
- * Development of environmentally sustainable nature-based tourism.
- * Strengthening of systems of conservation areas, including protected areas.
- * Integrated pilot projects to provide alternative livelihoods to communities, consistent with biodiversity conservation and sustainable use.
- * Introduction of innovative measures, including economic incentives, for the conservation and sustainable use of biodiversity.

FAUNA and FLORA INTERNATIONAL

Kwakuchinja Corridor, Tanzania

In partnership with the Netherlands Committee of IUCN, FFI plans to provide financial and technical assistance to the Tanzania Land Conservation Trust and the African Wildlife Foundation for the establishment of a wildlife corridor in Kwakuchinja. This initiative will secure land between Tarangire NP and Manyara Ranch, and will be a critical lifeline to wildlife in this region.

FAUNA and FLORA INTERNATIONAL

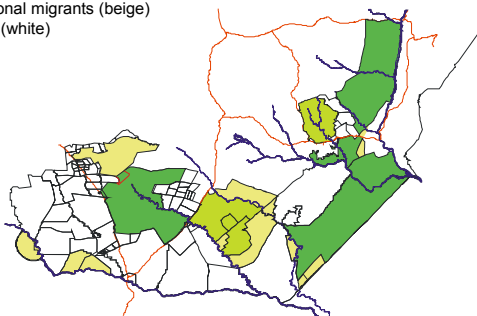
Sera Wildlife Conservancy

The Sera Wildlife Conservancy Project is a Kenyan conservation initiative recently established by FFI and a Kenyan non-profit organization, Lewa Wildlife Conservancy (LWC) in conjunction with Samburu, Rendile and Boran communities.

FIRST STEPS

SHOW THE PICTURE

Wild dog distribution:
 Breeding populations (dark green)
 Breeding populations threatened - and/or are not of a size that guarantees indefinite existence in the area (light green)
 Occasional migrants (beige)
 Absent (white)



IDENTIFY A SET OF PRIORITY SPECIES ("FLAGSHIPS" OR KEY RESOURCE SPECIES) FOR WILDLIFE-BASED LAND-USE

RELATIVELY STRAIGHTFORWARD AND COST-EFFECTIVE MEANS OF DETERMINING THE CONSERVATION STATUS/DISTRIBUTION OF THESE SPECIES MUST BE AVAILABLE FOR LOCALLY-BASED MONITORING

PRIORITY SPECIES FOR 1.) SAFARI HUNTING, 2.) ECOTOURISM
 Must also consider TFCA restocking importance so that incentives-based breeding programmes can be encouraged

GET STAKEHOLDERS TO PRIORITIZE SPECIES (PAIR-WISE COMPARISON, THURSTONE MODEL OF COMPARATIVE JUDGEMENT)
 DERIVE AN "IMPORTANCE" COEFFICIENT (WEIGHTING) FOR EACH SPECIES

DEVELOP CATEGORIES OF CONSERVATION STATUS FOR EACH SPECIES FROM POOR CONSERVATION STATUS TO GOOD CONSERVATION STATUS
 Get relevant IUCN/SSC Specialist Groups to do this

Discussion:

Initial discussion centered on the name of the proposed forum and whether "Wildlife Forum" was appropriate. It was suggested that agriculture should be included, particularly since the construction of the Tokwe-Makorsi dam would make an enormous difference to agricultural production in the SEL. However it was also noted that there were several smaller potential schemes that could be started now. Further discussion included the following:

1. Alternative suggestions for the name of the forum were "SEL Wildlife Development Forum" or "SEL Natural Resource Management Forum".
2. There were three sectors involved in the SEL and these included large and small-scale operators, all of whom needed to be considered. The Tokwe-Makorsi scheme was a huge investment but there were many smaller potential developments that merited attention.
3. Perhaps there was a need for a comparable agricultural development forum?
4. There was a clear need to draw farmers off marginal land and on to good, productive soils for sustainable, intensive production. Such a strategy could also serve to draw people off marginal lands that are more suited to extensive production and particularly wildlife-based tourism.
5. It was important to carefully consider the tactics to be employed in starting an initiative such as the proposed forum.

6. The FMD fence and its alignment had implications for marketing and the pros and cons of the various options for realigning the fence needed critical analysis. Some of the proposed boundaries were contentious and include issues related to zoning and access to abattoirs. There was a clear need to examine alternative scenarios and their implications in the FMD fencing issue.
7. The development of communities (e.g. micro-irrigation) was a critical component of the overall development in the SEL – “poor neighbours are bad neighbours” when it comes to wildlife development in the lowveld.
8. In response to a question from the facilitator there were no objections or contrary arguments raised to the suggestion that an appropriate forum should be established.

5. STAKEHOLDERS AND THEIR INFORMATION NEEDS

Each participant was provided with two cards, one of which identified a stakeholder in the wildlife industry in the SEL and the second card suggested one or more types of information needed by the stakeholder. The cards as presented are shown in Table 1. The stakeholders fell into two broad categories, one being the agencies responsible for regulating natural resource use and the other comprising those more directly involved in managing resources. The needs and priorities of these two groups were then further examined by working groups in the second working session, after lunch (see below).

Table 1. Stakeholders and information needs (Participants cards)

Stakeholder	Information needs
RDC	Continual sustainable wildlife benefit
Conservancies	What is extent and dynamics of illegal bushmeat trade
PWMA	Key public sector partner
RDC	Animal population
Buhera RDC	Types and levels of farming activities
SVC	Impact of elephant (Develop elephant management policy)
Veterinary Services	Long term surveillance system (disease)
NGO	Intervention requirement
CASS	What strategies exist with other countries in development of TFCA-SEL needs and aspiration of resident population in the GLTFCA
Urban Residents	Recreation opportunities, investment
Traditional Leaders	Land use and benefit sharing
RDC	Water: surface and groundwater – quantity and quality
Wildlife producer community	Human and domestic animal numbers
RDCs representing communities	Total revenue generated in wildlife activities in their area of involvement and their share
Wildlife producers (both commercial and CBNRM)	What linkages (spatial and economic)
Regional TFCA partners (like AHEAD)	Landuse plans, Ecol/Social data, policy changes
NGO	Animal population on lowveld
RDC	Awareness programmes to communities
Sugar Sector	Water sharing
Beitbridge RDC	Feedback on community outreach programmes
Safari Operators	Wildlife populations, trophy quality
ZTA	Tourism facilities and products available

Discussion

The following questions and points were raised in discussion of the cards in Table 1.

1. Are the RDCs representatives of their individual communities? It was noted that

RDCs are the appropriate authority for wildlife in the communal lands in their Districts and until that is changed they represent communities on wildlife matters. However, in terms of the Traditional Leaders Act, the traditional leaders should also be reflected as stakeholders in so far as they represent community interests in natural resource management, land use and benefit sharing. The Act gives traditional leaders clear responsibilities as custodians of natural resources in their areas.

2. Are cities and towns stakeholders in what happens in the surrounding countryside since they depend on, and influence, the ecosystem goods and services of surrounding areas? It was argued that including too many stakeholders would lead to confusion and inaction. On the other hand, while urban residents need not be directly involved managing or regulating resource use, they did have interests in recreational and investment opportunities and environmental health of the surrounding land. The private sector, residing in cities, may also have an interest in construction and the development of infrastructure in wildlife areas within the lowveld.
3. Zimbabwe Tourism Authority (ZTA) should be included as a stakeholder, as should the TFCA Conservation and Veterinary Sub-committee.

6. MONITORING PRIORITIES

Two working groups examined monitoring priorities for the wildlife industry in relation to the SEL and in relation to the TFCA and its development. The working groups were: (a) regulatory agencies such as National Parks, RDCs and Veterinary Services, and (b), resource managers and users which included Conservancies, Communities, agriculturalists, and Parks. Note that the PWMA functions both as a regulator and as a resource manager directly responsible for managing some 13% of Zimbabwe. Pin boards and cards were used by each group and these are reflected in Tables 2 and 3 below.

6.1 Report back from Working Groups and discussion

(a) Priorities for regulatory agencies

1. The listing given in **Table 2** was not in order of priority and, in response to a question of whether or not all of the monitoring and associated activities were necessary; the group responded that they were.
2. The suggestion that Veterinary Services required additional human resources was questioned and it was suggested that the problem was not a shortage of people to do the monitoring but a lack of financial resources for existing staff to operate in the field.
3. Several of the monitoring needs could be combined and met by single returns, e.g. those from safari operators relating to quotas and trophy offtakes and trophy quality.
4. While much of the information could be captured in computer databases, this needed appropriately trained people in the right place and this was seldom realized.
5. The example of health workers based at village level was one that could be emulated. They have been able to carry out an important service and monitoring function with minimal equipment and resources.

Table 2. Cards form Working Group 1.

REGULATORY AGENCIES: RDCs, Government, PWMA, Veterinary Services				
Priorities	Technical Assistance	Financial Resources	Human Resources	Other
Information on the prevalence of diseases	✓	✓	✓	Availability of drugs
Wildlife numbers and trends	✓	✓	✓	
Poaching levels and trends	✓	✓	✓	
Trophy quality and trends	✓	✓	✓	
PAC statistics	✓	✓	✓	
Carrying capacities	✓	✓	✓	
Understanding the implications of international agreements and treaties	✓	✓		
Understanding national regulations	✓	✓		
Marketing and pricing and monitoring	✓	✓	✓	
Managing safari contracts	✓	✓		
Incomes and investment trends			✓	

Table 3. Cards from Working Group 2

RESOURCE MANAGERS and USERS: Conservancies, PWMA, Communities		
Priorities	Who	Resources
Defining stakeholders	Selcore, RDC, TFCA, AHEAD	Lowveld Council Agric Forum
Coordination and facilitation		
Community participation in wildlife industry	RDCs, PPCPs, NGOs, Selcore TFCA, AHEAD	Wildlife Forum Wildlife Mgmt. Trust
Awareness		
Wildlife status	PWMA, NGOs, Conservancies, RDCs, Landowners	
Wildlife Production potential		
Competitive forms of landuse	Professional Institutions, Researchers (GIS)	
Wildlife production units		
Illegal hunting	Conservancies, PWMA, RDCs, Landowners, Researchers	
Indicators of human welfare	Research Institutions, NGOs	
Disease	Vet Services, Min Health, AHEAD	
Safari hunting	PWMA, RDCs, ZTA, Conservancies	
Tourism		

(b) Priorities for resource management agencies

The second Working Group noted that they had not prioritized their listing of monitoring and information needs but had grouped them by users (or generators) of the information.

Groupings included those such as spatial data, research issues, and disease issues. There was an overriding need to plug the gaps in management and monitoring capacity and this could best be done by establishing a Wildlife Management Trust that was under the proposed Wildlife and Development Forum. There was some discussion about the need to establish a separate Agricultural Development Forum in addition to a wildlife forum but a clear consensus on the matter did not emerge.

The following points emerged in the discussion following the presentation by the second Working Group.

1. In terms of linkages to the wider development of the SEL both an agricultural and a wildlife forum could feed into the District Development Committees. There were also District TFCA Committees into which both a wildlife forum and trust could be linked. The fora could similarly provide services to provincial development committees on wildlife matters.
2. In response to a question about how a Forum and a Trust could be funded it was suggested that initially they would probably need to be donor funded. Long term support and sustainability would probably have to be based on levies. As an example of an industry supporting its own research and development it was noted that the tobacco industry set up its own Tobacco Research Board and associated testing laboratories in the 1950s following dissatisfaction with the support and services provided by government. Research and development were supported by a levy on each bale of tobacco sold and the result was a very rapid increase in yields, quality and growth of the industry. Cotton producers later followed a similar model and the Sugar Association has its own research facility.
3. There were issues of scale that would need to be addressed. A wildlife forum and trust servicing only the lowveld may not be at a sufficiently large scale to be viable.
4. The potential of support funding from the TFCA developments should be considered. Mozambique has received US\$30 million for TFCA development and SANParks has received major funding from the South African Government.
5. ZTA and tourist levies?
6. Sugar industry support?
7. What indicators of human welfare did the working group have in mind? There were several standard indicators such as annual family income and health indices used by international agencies. Health was, however, determined by a number of factors. The five capitals (human, natural, social, financial, physical) used in the sustainable livelihoods approach to rural development and poverty eradication provide a very useful set of development and welfare indicators – some of which can be very straight forward.

7. SELCORE MEMBERSHIP AND A WILDLIFE & DEVELOPMENT FORUM FOR THE SOUTH EAST LOWVELD

7.1 Report back on SELCORE Committee Meeting

The following were agreed by the Committee:

1. Membership of SELCORE should be extended to include Beitbridge, Gwanda and Mwenezi RDCs, the Wildlife and Forestry Dept at NUST, Buby River Conservancy, and Triangle Estate, NPWLM and Veterinary Services. CESVI should be included as a supporting NGO. The Resilience Alliance continued to be interested in the SEL but presently did not have supporting funding. There was consensus from the workshop that invitations should be extended to these agencies. Hippo Valley had not so far been involved in SELCORE and it was agreed that they should be invited to participate in future workshops.
2. The Committee asked David Cumming to continue to Chair the SELCORE Committee for a further year and he agreed to do so. He noted, however, that the intention had always been for the committee to be chaired by a person residing in the lowveld.
3. Representation on the Committee from RDCs should be increased to two. At present the 5 RDCs neighbouring Save Valley Conservancy and Malilangwe were represented on the Committee by Abraham Sithole who was Chair of the Joint RDC Committee. With three additional RDCs a second representative should be elected by RDCs to serve on the Committee.
4. The offer by Sand County Foundation to support a part time coordinator for SELCORE was welcomed and a recommendation on the appointment of a candidate for the position would be made to the Sand County Foundation.
5. The proposal to establish a Wildlife Development Forum should be pursued.

Workshop participants endorsed the committee's recommendations and agreed that the Chair should redraft the MOU to include additional members once they had been contacted. The redrafted MOU would then be circulated and a meeting convened to sign it.

The existing and potential expanded membership of SELORE is illustrated in the diagram below (Page 23).

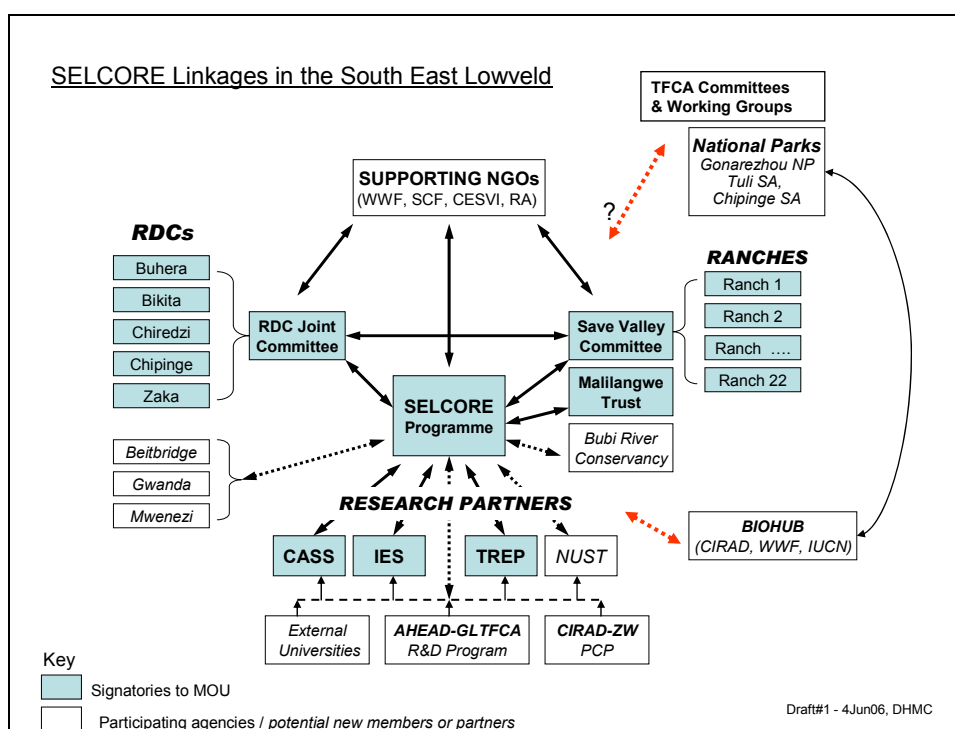


Diagram showing the current and potential signatories and linkages to SELCORE.

7.2 Wildlife Development Forum for the SEL

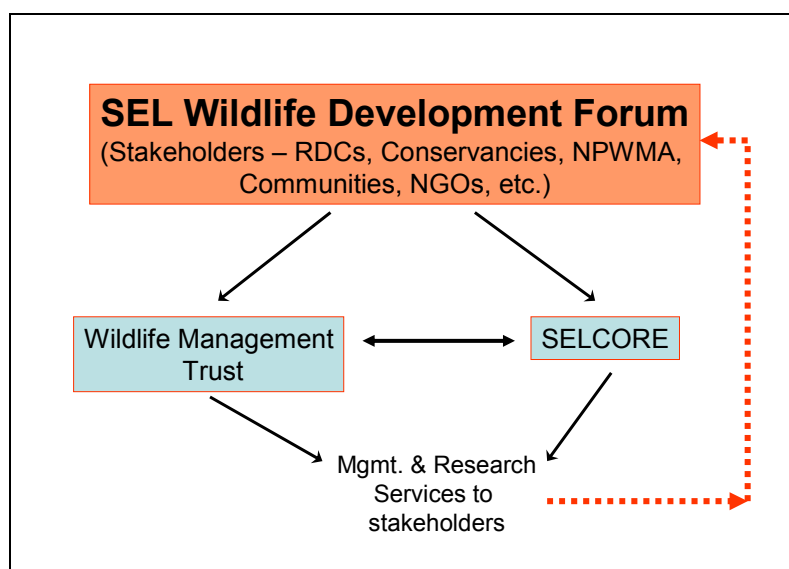


Diagram illustrating structure of the proposed forum and linkages

Although the name of the forum was not fully resolved the general links/structure envisaged for the forum was as illustrated in the diagramme above. The following points were made in the discussion preceding and during deliberations on the next steps to be taken in relation to

the proposed forum.

1. The Wildlife Management Trust would be responsible to the Forum and provide direct technical services to stakeholders, e.g. game capture and translocation.
2. Both the Forum and the Trust, its baby, would need to hold legal status with the members of the Forum being the trustees of the Management Trust..
3. Links between the proposed forum and the TFCA Conservation and Veterinary Sub-committee would be much the same as those between any government committee and farmer or landholder associations. One would not subsume the other.
4. Political sensitivities will be aroused in the establishment of a forum but suspicions should not be aroused if it is done transparently through the District Development Committees. Where plans are developed they will need to become part of the DD plan and be taken to provincial levels. There will be eight RDCs involved and it will be necessary for them to be convened from major developments that cross district boundaries.
5. The planned BIOHUB monitoring programme will need to fit in with the lowveld forum process, rather than vice versa.
6. Both INR and the AHEAD-GLTFCA programme have some resources that could be tapped to assist in scenario planning and exploring alternative futures in the development of the proposed forum. Such planning would be at a higher institutional level than the scenario planning project due to be implemented by CASS. Scenario planning may be very useful in examining the implication of alternatives for the FMD fence.
7. The suggestion that a meeting of stakeholders and representatives should be held in September to discuss the concept document, draft constitution, and other matters needed to take the process forward, was endorsed.

8. NEXT STEPS

The following next steps and actions were agreed upon:

1. SELCORE

- a) New Members. **ACTION:** The proposed additional members of SELCORE to be formally invited to join by the Chair who would so for NPWMA, Vet Services, and Campfire, by Abraham Sithole who would approach the RDCs, and by Clive Stockil who would approach Buby River Conservancy.
- b) Appoint coordinator. **ACTION:** Chair to communicate Committee recommendation to SAND County Foundation.
- c) Record of Workshop proceedings and Committee Meeting Minutes. **ACTION:** To be written up by Chair and circulated with the next two weeks

2. Wildlife Development Forum & Wildlife Management Trust

- a) A two page concept document outlining a proposed formal structure to be drafted. **ACTION:** Raoul du Toit
- b) A constitution to be drafted and circulated to potential members for their consideration within the next two weeks. The possible options for the legal status of the Forum and Trust to be investigated. **ACTION:** Raoul du Toit
- c) Those RDCs not present to be informed, as well as District Development Committees, NPWMA, Campfire Association and Veterinary Services. **ACTION:** Chair and du Toit to meet with NPWLMA, Campfire and Veterinary Services.
- d) Meeting of stakeholders to be organized for September and to include a scenario planning session.
- e) Appropriate information and lobbying to be undertaken in relation to RDCs and Members of Parliament by SELCORE members within the SEL.

9. ANY OTHER BUSINESS

1. **Bushmeat research.** Peter Lindsey asked how he should approach the question of getting RDC support for extending the research on the bushmeat trade into the communal lands surrounding the SVC. He was advised to approach the District Administrator and the CEO of the RDC in the respective districts and obtain their support for the work, in the form of a supporting letter.
2. **Zebra poaching and skin trade.** Mr. Modeme pointed out that Beitbridge had a different problem in that there was a flourishing illegal trade in zebra skins that involved markets in South Africa. Animals were being shot and skinned and the carcasses were left to rot in the bush. This problem need the involvement of TRAFFIC and the Regional TRAFFIC office in Harare would be informed.
3. **Links with SA in the Shashe-Limpopo TFCA.** Mr Modeme raised the matter of linkages with South African research and technical groups that were working in the South African part of Shashe-Limpopo TFCA. Could Beitbridge draw on their expertise and how might this link in with the proposed forum and SELCORE? Cumming suggested that there shouldn't be a problem with using their expertise and

informally involving them, if they so wished, in the SELCORE programme. Once such linkages were established the question of how they might link more formally with the forum could be explored. Stockil stated that there was no question of a forum imposing themselves on anyone and that open dialogue and exchange of ideas and assistance should prevail. Similar issues faced the GLTFCA in relation to Mozambique and the best approach was to work from the bottom up in establishing stakeholder support and linkages, as well as joint approaches to managing wildlife across borders. The CESVI project, which is due to start later in the year, would be concentrating on some of these issues.

In closing, Mr Sithole said that while meetings were difficult and costly to convene we have to make the effort otherwise we won't get our business done – if we don't do it ourselves, who will do it?

10. APPENDICES

10.1 LIST OF PARTICIPANTS

Name	Affiliation and Address	e-mail address
Anderson, Natasha	Towla HQ, Buby Valley Conservancy 011 863 084, Box BW 164, Borrowdale, Hre	nanderson@wwfsarpo.org
Caron, Alexandre	CIRAD, 9 Balmoral Road, Borrowdale Harare	Ciradzim@cirad.fr
Chirozva, Chaka	CASS, Univ. Zimbabwe, P O Box MP 167, Mount Pleasant, Harare. Ph: 303306/7, 091 397 735	cchirozva@yahoo.co.uk
Chikanya, Elton	President's Dept. Box 261, Chiredzi. 031 2224,	
Choga, Thomas	Chiredzi RDC, 031-3411, 091 939 588	
Cumming, David	Box HG 400, Highlands, Harare	cumming@icon.co.zw
Cumming, Meg	Box HG 400, Highlands, Harare	megcumming@mango.zw
Du Toit, Raoul	10 Lanark Road, Belgravia, Harare. 252533/4	rdutoit@wwfsarpo.org
Goulet-Caron, Carole	9 Cambridge Close, Greendale, Harare.	caroncarole@hotmail.com
Lindsey, Peter	Save Valley Conservancy, P O. Box 47, Birchenough Bridge	plindsey@gmail.com
Maphala, Methuseli	CESVI, Bag 7115, Chiredzi 031 3411, 091 413 677	413677@ecoweb.co.zw
Marufa, Richard	DA's Office, Box 79, Buhera, 021 2497	
Middleton, Angus	Triangle Estate	
Modeme, S.	Beitbridge RDC, Box 32, Beitbridge	s.modeme@bbrdc.co.zw
Mundoma, J.	Chipinge RDC, Box 19, Chipinge	chiprdc@zimlink.co.zw
Murphree, Michael	Institute Natural Resources, Pietermaritzburg, SA (27-33) 346 0796	murphreem@ukzn.ac.za
Musomekwa, F. John	Buhera RDC, P Bag 2002, Murambinda, 012 2284/6	
Mutomani, John	LEAP, Box 81, Chiredzi, 091 417 780	
Pole, Alistair	19 Rolf Avenue, Harare.	apole@earth.co.zw
Romañach, Stephanie	Po Box 47, Birchenough Bridge, Save Valley Conservancy	stephanie.romanach@gmail.com
Saunders, Colin	Malilangwe Trust, 091 257 392/3	saunders@malilangwe.org
Sithole, Abraham	Chiredzi RDC, Box 128, Chiredzi. 011 613 899	
Stockil, Clive	Senuko Safari Lodge, Box 160, Chiredzi 031-7242/3, 091 219 204	clives@senuko.com



COLLEGE OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL SCIENCE, POLICY & MANAGEMENT
137 MULFORD HALL #3114

BERKELEY, CALIFORNIA 94720
(510) 643-7430
FAX (510) 643-5438

LETTER OF UNDERSTANDING

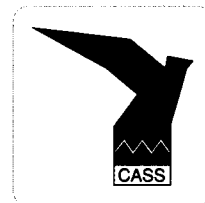
We the undersigned agencies and individuals hereby express our intention to participate and collaborate, in so far as our resources in time and funds allow us to, in the development and execution of the AHEAD-GLTFCA programme on sustaining animal health and ecosystem services in the Greater Limpopo Transfrontier Conservation Area.

More specifically the overall long term objective of this programme is to:

Facilitate development and conservation success in the GLTFCA through integrated understanding based on innovative inter-disciplinary applied research, monitoring and surveillance at the interface between wild and domestic animal health, ecosystem goods and services, and human livelihoods and wellbeing.

The programme to which we refer is more fully outlined in the widely circulated concept paper developed by the AHEAD-GLTFCA Working Group in March 2004 entitled "***Sustaining animal health and ecosystem services in large landscapes – 2nd Draft***". The planned programme is outlined in the attached ANNEX in the form of an ***Objectives Tree***.

Wildlife Epidemiology Group, the Department of Environmental Science, Policy and Management, College of Natural Resources, UC Berkeley	Wayne Getz Wayne M. Getz, Professor and Divisional Head	Digitally signed by Wayne Getz DN: CN = Wayne Getz, C = US, O = UC Berkeley Date: 2005.07.26 09:34:16 -07'00'	July 26, 2005
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LETTER OF UNDERSTANDING

We the undersigned agencies and individuals hereby express our intention to participate and collaborate, in so far as our resources in time and funds allow us to, in the development and execution of the AHEAD-GLTFCA programme on sustaining animal health and ecosystem services in the Greater Limpopo Transfrontier Conservation Area.

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Dr. J.M. Manjengwa
CASS Director

**CENTRE FOR APPLIED
SOCIAL SCIENCES
UNIVERSITY OF ZIMBABWE**

PO Box MP 167
Mount Pleasant
Harare
Zimbabwe
Tel: +263-4-303211 ext. 1340
Direct Lines: +263-4-303306/7
Fax: +263-4-307134
email: cass@cass.uz.ac.zw

All communications should be addressed to:
THE PRINCIPAL DIRECTOR

Telephone: +263 4 791355/6

Fax: +263 4 791516/722711

E-mail: veeu@africaonline.co.zw
Harare, Zimbabwe



ZIMBABWE

Reference:

TFP/CON/01

DIVISION OF LIVESTOCK AND VETERINARY SERVICES

Ministry of Agriculture
P.O. Box CY 66, Causeway
Harare, Zimbabwe

13TH OCTOBER, 2005

LETTER OF UNDERSTANDING

The Division of Livestock and Veterinary Services, within the Ministry of Agriculture of Zimbabwe, hereby expresses the intention to participate and collaborate, in so far as resources in time and funds allow, in the development and execution of the AHEAD-GLTFCA programme on sustaining animal health and ecosystem services in the Greater Limpopo Transfrontier Conservation Area.

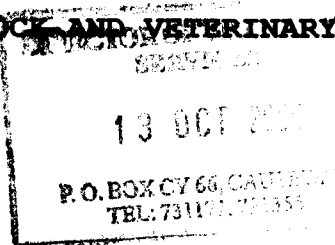
Specifically, the overall long-term objective of this programme is to:

Facilitate development and conservation success in the GLTFCA through integrated understanding based on innovative inter-disciplinary applied research, monitoring and surveillance at the interface between wild and domestic animal health, ecosystem goods and services, and human livelihoods and wellbeing.

The programme is fully outlined in the widely circulated concept paper developed by the AHEAD-GLTFCA Working Group in March 2004 entitled "**Sustaining animal health and ecosystem services in large landscapes - 2nd Draft**". The planned programme is outlined in the attached single page ANNEX in the form of an **Objectives Tree**.

DR S K HARGREAVES

PRINCIPAL DIRECTOR LIVESTOCK AND VETERINARY SERVICES



To acquire and manage a system of national parks which represents the indigenous wildlife, vegetation, landscapes and significant cultural assets of South Africa for the pride and benefit of the nation.



LETTER OF UNDERSTANDING

We the undersigned agencies and individuals hereby express our intention to participate and collaborate, in so far as our resources in time and funds allow us to, in the development and execution of the AHEAD-GLTFCA programme on sustaining animal health and ecosystem services in the Greater Limpopo Transfrontier Conservation Area.

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D. J. Pienaar

Head: Scientific Services

Kruger National Park

addo elephant

aguihas

augrabies falls

bontebok

cape peninsula

golden gate highlands

karoo

kgalagadi transfrontier

knysna

kruger

marakele

mountain zebra

namaqua

tanqua karoo

tsitsikamma

richtersveld

vaalbos

vhembe dongola

west coast

wilderness



October 5, 2005

LETTER OF UNDERSTANDING – AHEAD GLTFCA

The Wildlife Conservation Society (WCS) hereby expresses our intention to participate and collaborate, in so far as our resources in time and funds allow us to, in the development and execution of the AHEAD-GLTFCA programme on sustaining animal health and ecosystem services in the Great Limpopo Transfrontier Conservation Area (GLTFCA).

More specifically the overall long-term objective of this programme is to:

Facilitate conservation and development success in the GLTFCA through integrated understanding based on innovative inter-disciplinary applied research, technical support, monitoring and surveillance at the interface between wild and domestic animal health, ecosystem goods and services, and human livelihoods and wellbeing.

The programme to which we refer is more fully outlined in the widely circulated concept paper developed by the AHEAD-GLTFCA Working Group in March 2004 entitled ***“Sustaining animal health and ecosystem services in large landscapes – 2nd Draft – Concept for a programme to address wildlife, livestock and related human and ecosystem health issues in the Greater Limpopo Transfrontier Conservation Area”*** as posted at http://www.wcs-ahead.org/workinggrps_limpopo.html.

WCS looks forward to ongoing collaborative progress on this pioneering initiative.

Sincerely,

A handwritten signature in black ink, which appears to read "Steve Osofsky". The signature is fluid and cursive, with a long horizontal stroke at the end.

Steve Osofsky, DVM
Wildlife Conservation Society- Field Veterinary Program
Senior Policy Advisor, Wildlife Health
WCS AHEAD Coordinator
<osofsky@wcs.org>
ph/fax: 1-703-716-1029
www.wcs-ahead.org



LETTER OF UNDERSTANDING

We the undersigned agencies and individuals hereby express our intention to participate and collaborate, in so far as our resources in time and funds allow us to, in the development and execution of the AHEAD-GLTFCA programme on sustaining animal health and ecosystem services in the Greater Limpopo Transfrontier Conservation Area.

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Facilitate development and conservation success in the GLTFCA through integrated understanding based on innovative inter-disciplinary applied research, monitoring and surveillance at the interface between wild and domestic animal health, ecosystem goods and services, and human livelihoods and wellbeing.

The programme to which we refer is more fully outlined in the widely circulated concept paper developed by the AHEAD-GLTFCA Working Group in March 2004 entitled "***Sustaining animal health and ecosystem services in large landscapes – 2nd Draft***". The planned programme is outlined in the attached ANNEX in the form of an ***Objectives Tree***.

A handwritten signature in black ink, appearing to read 'S. Kativu', is positioned above the printed name.

Dr. S. Kativu

TREP Coordinator



for a living planet®

**WWF Southern Africa
Regional Programme
Office**
P.O. Box CY 1409
Causeway

Tel: +263 04 252533
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10 Lanark Road
Belgravia
Harare
Zimbabwe

wwfsarpo@wwfsarpo.org
<http://www.panda.org/sarpo>

05 October 2005

LETTER OF UNDERSTANDING

We the undersigned agencies and individuals hereby express our intention to participate and collaborate, in so far as our resources in time and funds allow us to, in the development and execution of the AHEAD-GLTFCA programme on sustaining animal health and ecosystem services in the Greater Limpopo Transfrontier Conservation Area.

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Dr. H.O. Kojwang
Regional Representative



LETTER OF UNDERSTANDING

We the undersigned agencies and individuals hereby express our intention to participate and collaborate, in so far as our resources in time and funds allow us to, in the development and execution of the AHEAD-GLTFCA programme on sustaining animal health and ecosystem services in the Greater Limpopo Transfrontier Conservation Area.

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ARC-Onderstepoort Veterinary Institute

.....
 Prof. A. Musoke/Research & Technology
 Manager

.....
 Date

Tropical Ecology Resource Ecology
 Programme, University of Zimbabwe

.....
Signature.....
 Name/Position

.....
 Date

Center for Applied Social Sciences,
 University of Zimbabwe

.....
Signature.....
 Name/Position

.....
 Date

Wildlife Conservation Society

.....
Signature.....
 Name/Position

.....
 Date

Mammal Research Institute, University of
 Pretoria

.....
Signature.....
 Name/Position

.....
 Date

South African National Parks

.....
Signature.....
 Name/Position

.....
 Date

Wildlife Research Unit, Veterinary
 Services, Zimbabwe

.....
Signature.....
 Name/Position

.....
 Date

Note: List of agencies to be arranged alphabetically



INSTITUTE OF NATURAL RESOURCES

Association incorporated under Section 21 1996/000355/08

Innovation in natural resource management

17 July 2006

LETTER OF UNDERSTANDING

We, the Institute of Natural Resources hereby express our intention to participate and collaborate, in so far as our resources in time and funds allow us to, in the development and execution of the AHEAD-GLTFCA programme on sustaining animal health and ecosystem services in the Greater Limpopo Transfrontier Conservation Area.

More specifically, the overall long-term objective of this programme is to:

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The programme to which we refer is more fully outlined in the widely circulated concept paper developed by the AHEAD-GLTFCA Working Group in March 2004 entitled **"Sustaining animal health and ecosystem services in large landscapes – 2nd Draft"**. The planned programme is outlined in the attached single page ANNEX in the form of an **Objectives Tree**.

Jennifer Mander
Executive Director

P.O. Box 100396, Scottsville 3209, South Africa. Telephone: +27 (0)33 346-0796. Facsimile: +27 (0)33 346-0895
67 St Patricks Road, Pietermaritzburg 3201 South Africa. e-mail: inr@ukzn.ac.za website: www.inr.org.za

An Associate Institute of the University of KwaZulu-Natal

Directors: B.I. Khumalo (Chairman), D.M. Beaven, S.A. Bodhanya, R.M. Evans,
J.J. Mander, R.E. Stewart, K.E. Tieuber.



PROGRAMME OBJECTIVES TREE

“Sustaining animal health and ecosystem services in large landscapes”

A program to address wildlife, livestock and related human and ecosystem health issues in the Greater Limpopo Transfrontier Conservation Area

Overall Programme Goal:

Facilitate development and conservation success in the GLTFCA

Programme Purpose:

Contribute towards establishing an integrated understanding of the Social-Ecological systems of the GLTFCA based on innovative inter-disciplinary applied research, monitoring and surveillance at the interface between wild and domestic animal health, ecosystem goods and services, and human livelihoods and wellbeing



Output #1: An enabling framework for a long term R&D program initiated* (Theme #1)**	Output #2: Integrated, long term R&D program established for (Themes 2 – 4 of the overall program)	Output #3 Framework for policy support and capacity building in operation (Theme #5)	Output #4: Communications and Outreach program established (Theme #6)	Output #5: Overall program management established and working effectively
Activities: 1. Develop an overarching conceptual framework for the program 2. Explore alternative scenarios for the GLTFCA at several scales (local to regional) 3. Assess current status of wildlife-livestock-human diseases and disease risk factors in the GLTFCA 4. Critically review current knowledge on wildlife, livestock, and human health & ecosystem services in GLTFCA. 5. Develop indicators against which to measure programme progress 6. Facilitate the development of collaborative agreements for the overall long-term R&D program.	Activities: 1. Develop more explicit research proposals & programs for each theme and its modules. 2. Submit proposals to potential donors and implement once funding is secured 3. Encourage independent research groups to participate fully in the program and to bring their own resources to it. 4. Foster full inter-disciplinary contact and interaction between researchers in all themes and modules and with related research and development initiatives in the region.	Activities: 1. Initiate and facilitate dialogue for developing policy on wildlife/livestock/human health issues in the GLTFCA 2. Encourage the production of “policy briefs” as part of research output. 3. Continuing analysis of policy implications on animal, human and ecosystem goods and services 4. Set up seminars and training courses in policy analysis 5. Assist in harmonizing policy and practice in disease control across international borders and in the region	Activities: 1. Establish framework for communication between researchers and main stakeholders in the GLTFCA 2. Fully support communications and outreach between researchers, farmers, resource managers relevant agencies and stakeholders. 3. Establish appropriate linkages with development and health agencies and projects working in the GLTFCA. 4. Establish links and/or partnership with other projects involved in improving communications in remoter areas	Activities: 1. Once programme reaches appropriate size and critical mass facilitate the establishment of an “Institutional home” and recruitment of overall Programme Scientific Director, Programme Manager and Project Leaders for each theme. 2. Admin and accounting staff appointed 3. Financial reporting systems for multiple donors in place 4. etc. etc.

*In a programme this size each Output and each of the themes would merit a separate log frame/objectives tree.

** “Themes” and their “Modules” are outlined in the March 2004 AHEAD-GLTFCA Working Group Paper.

Sustaining animal health and ecosystem services in large landscapes – 2nd Draft

Concept for a programme to address wildlife, livestock and related human and ecosystem health issues in the Greater Limpopo Transfrontier Conservation Area

by

David H M Cumming

Prepared on behalf of the

AHEAD-GLTFCA Working Group & the Wildlife Conservation Society

March, 2004

Contents

Summary

1. Introduction
2. Background and assumptions
3. Project objective and justification
4. Themes, modules and approach
 - Theme #1. Overarching conceptual framework
 - Theme #2. Animal health and disease
 - Theme #3. Land use, ecosystem goods and services, and animal health
 - Theme #4. Human livelihoods, animal and ecosystem health
 - Theme #5. Policy support and capacity building, at local national and regional levels
 - Theme #6. Communications and outreach
5. Context
6. Coordination and integration
7. References

Acronyms used

<i>AHEAD</i>	Animal Health for the Environment And Development
BTb	Bovine tuberculosis
FMD	Foot and Mouth Disease
GLTFCA	Greater Limpopo Transfrontier Conservation Area
GLTFNP	Great Limpopo Transfrontier National Park
FNP	Forum Natureza um Perigo
SDI	Spatial Development Initiative
SES	Social-ecological system
S-LTFCA	Shashe-Limpopo Transfrontier Conservation Area
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature
AWF	African Wildlife Foundation

Acknowledgements

I thank WCS and Steve Osofsky for support in developing this paper. I am also grateful to Harry Biggs, Meg Cumming, Graeme Cumming, Mike Kock and Steve Osofsky for reviewing earlier drafts of this concept paper and for their helpful and constructive comments and suggestions. Respondents to the 1st Draft presented at the Working Group Meeting held in Pretoria on the 25th February, 2004 made valuable observations and suggestions on the concept; they were Harry Biggs, Roy Bengis, Johan du Toit, Chris Foggin and Michael Murphree – thank you. Harry Biggs provided me with valuable feedback after the 2nd *AHEAD*-GLTFCA meeting in Pretoria in November 2003, and Giuseppe Daconto and CESVI kindly made Fig. 1 available. Finally, my thanks are due to all of the *AHEAD*-GLTFCA working group members whose ideas and contributions in the initial working session in Durban and their subsequent constructive critical comment at the 2nd and 3rd meetings of the *AHEAD*-GLTFCA Working Group in Pretoria in November, 2003 and in February 2004 have made this report possible.

SUMMARY

The transboundary management of natural resources, particularly of water and wildlife, and the associated development of transfrontier conservation areas (TFCAs) has been a major focus of attention over the last few years in southern Africa. Transboundary natural resource management (TBNRM) and TFCA development has also been closely linked to emerging Spatial Development Initiatives (SDIs) and corridors within southern Africa. A key economic driver linking these conservation and infrastructure development initiatives is wildlife based tourism that seeks to maximise returns from marginal lands in a sector where southern Africa enjoys a global comparative advantage. However, the management of wildlife and livestock diseases within the envisaged larger transboundary landscapes remains unresolved and an issue of major concern to other economic sectors in the region. The interactions at the interface between animal health, ecosystem services and human wellbeing are also poorly understood with the result that policy development is compromised by a lack of appropriate information and understanding of the complex systems and issues involved.

Twenty potential and existing Transfrontier Conservation Areas (TFCAs) have been identified in the SADC region, involving 12 continental African member states. The TFCAs include many national parks, neighbouring game reserves, hunting areas and conservancies, mostly occurring within a matrix of land under traditional communal tenure. Altogether the proposed TFCAs cover about 120 million hectares. This concept outlines a framework to establish a research and development (R&D) programme to address the wildlife, livestock and related human and ecosystem health issues in the Great Limpopo Transfrontier Conservation Area. This *AHEAD*-GLTFCA concept¹, has the potential to form a strong pilot project for tackling linked animal, human and ecosystem health issues associated with TFCAs in the SADC region.

The Great Limpopo Transfrontier Conservation Area is situated in south eastern Africa and straddles three countries and includes five national parks, neighbouring game reserves, hunting areas, conservancies and intervening areas of communal lands under traditional tenure. Altogether the TFCA covers about 10 million ha or 100,000 km². The longer term plans for this vast area currently focus primarily on the development of wildlife based tourism and envisage greater freedom of movement for wildlife and tourists across international and other boundaries. These developments have the potential to greatly increase interaction between wildlife, livestock and people over a much larger landscape than has been the case for the last few decades.

Ecological imperatives and economics are presently driving wildlife and livestock based land use in arid savannas to move “up-scale” and use multispecies systems of large mammalian herbivores over large areas². Animal diseases have, however, largely been controlled or contained by fences and intensive management of wildlife and livestock in separate, smaller and isolated patches of land. Very different approaches and techniques may be required to deal with animal health issues in larger landscapes and the more open, integrated land use systems likely to develop in TFCAs. The interface

¹ This concept originated at the Southern and East African Experts Panel on Designing Successful Conservation and Development Interventions at the Wildlife/Livestock Interface: Implications for Wildlife, Livestock, and Human Health, *AHEAD* (Animal Health for the Environment And Development) Forum, IUCN Vth World Parks Congress, Durban, South Africa, September 14th and 15th, 2003.

² Papers presented by du Toit and Fritz 2003, and Cumming and Slotow 2003, at the VIIth International Rangeland Congress in Durban, July 2003.

between animal and human (community) health and ecosystem health in large landscapes thus presents exciting challenges in research and management.

The overall **Objective** of the programme is to:

Facilitate development and conservation success in the GLTFCA through integrated understanding based on innovative inter-disciplinary applied research, monitoring and surveillance at the interface between wild and domestic animal health, ecosystem goods and services, and human livelihoods and wellbeing

This research and development programme is **justified** by the magnitude of wildlife-livestock disease issues in the future development of sustainable land uses, approaches to transboundary natural resource management and biodiversity conservation in southern Africa in general, and in the GLTFCA in particular. Some 60% of southern Africa is semi-arid to arid where extensive livestock and wildlife production systems are the most suitable and sustainable forms of land use. The need to arrest desertification and enhance the capacity of these areas to generate wealth and sustain improved human livelihoods is of paramount importance. Innovative and integrated approaches to disease and natural resource management based on sound knowledge and understanding, are urgently needed. An integrated, interdisciplinary programme such as is proposed here offers the most promising route forward in building the understanding needed to adaptively tackle these issues.

A framework of six main **themes** is proposed for the programme, namely,

- a. An overarching conceptual framework to facilitate integrated understanding through interdisciplinary approaches
- b. Animal health and disease
- c. Land use, ecosystem goods and services, and animal health
- d. Human livelihoods, animal and ecosystem health
- e. Policy support and capacity building at local, national and regional levels
- f. Communications and outreach

Within each of these themes three to five **research modules**, that include monitoring and surveillance, are defined. They will contribute to improved knowledge and understanding of the linked social-ecological systems that comprise the TFCA and the central role of animal, ecosystem and human health in these systems.

The context to the project and project area is briefly covered, with particular reference to animal health and land use in terms of historical changes, key environmental features, development and food security, socio-economic factors and wildlife policy and management.

The challenge of coordinating and integrating a large interdisciplinary research and development initiative is examined, and potential participating groups and organizations are indicated. Some existing initiatives in the TFCA area are mentioned.

A detailed budget for the programme has yet to be developed. However, a start-up phase building a common framework, establishing local and regional linkages, and tackling some of the more immediate disease surveillance and monitoring work in GLTFCA could be accomplished with a budget of between US\$ 0.75 and 1 million. A programme with all modules operating at a realistic level would probably require in the region of US \$12 million a year. Many of the sub-modules could be funded separately and the project could still achieve the aims of a targeted and integrated applied

research and development programme - provided that essential core themes, such as a unifying conceptual framework and a communications and outreach programme were in place.

A multifaceted research and development programme of this nature with wide applicability, and of high potential interest to policy makers at national and international levels, will clearly require the formation of a consortium of appropriate implementing partners and supporting agencies. The formation of such a consortium, which would include development and implementing partners in both public and private sectors, is under active consideration.

1. Introduction

The transboundary management of natural resources, particularly of water and wildlife, and the associated development of transfrontier conservation areas (TFCAs) has been a major focus of attention over the last few years in southern Africa. Transboundary natural resource management (TBNRM) and TFCA development has also been closely linked to emerging Spatial Development Initiatives (SDIs) and corridors within southern Africa. A key economic driver linking these conservation and infrastructure development initiatives is wildlife based tourism that seeks to greatly increase returns from marginal lands in a sector where southern Africa enjoys a global comparative advantage. However, the management of wildlife and livestock diseases within the larger transboundary landscapes that are envisaged remains unresolved and an issue of major concern to other economic sectors in the region. The interactions at the interface between animal health, human livelihoods and health and ecosystem services are also poorly understood; with the result that policy development is compromised by a lack of appropriate information and understanding of the complex systems and issues involved.

Twenty potential and existing Transfrontier Conservation Areas (TFCAs) have been identified in the SADC region involving 12 continental African member states. The TFCAs include many national parks, neighbouring game reserves, hunting areas and conservancies, mostly occurring within an intervening matrix of land under traditional communal tenure. Altogether the proposed TFCAs cover about 120 million hectares. This concept outlines a framework to establish a research and development (R&D) programme to address the wildlife, livestock and related human and ecosystem health issues in the Great Limpopo Transfrontier Conservation Area. This *AHEAD*-GLTFCA concept³ has the potential to form a strong pilot project for tackling linked animal, human and ecosystem health issues associated with TFCAs more broadly in southern Africa

The Great Limpopo Transfrontier Conservation Area (GLTFCA), covers *c.* 100,000 km² of Mozambique, South Africa and Zimbabwe (**Fig. 1**). The area includes several land use/land tenure regimes including national parks, state and private safari and hunting areas, conservancies and game ranches on freehold land, small-scale agro-pastoral farming areas under communal tenure, large scale commercial irrigation schemes, and smaller irrigation schemes within the communal areas. About 35% of the area comprises state protected areas and a further approximately 10% is freehold land under wildlife. Most of the remaining land, the matrix between the designated national parks, is under communal tenure with varying forms of small scale agro-pastoralism. The international treaty to establish the Great Limpopo Transfrontier National Park (GLTFNP) was signed by the presidents of Mozambique, South Africa and Zimbabwe in December 2002. Agreement has been reached on creating a transfrontier conservation area (TFCA) that encompasses the GLTFNP and the intervening matrix of conservancies and wildlife ranches on freehold land, together with the communal farming areas. The precise boundaries of this vast TFCA remain undefined but the primary land use in the matrix is expected to be wildlife based tourism with reasonably unimpeded movement of wildlife and tourists.

The control and containment of livestock diseases has, in the past, relied heavily on game fences and the control of wild and domestic animal movements and translocations. The prospect of

³ This concept originated at the Southern and East African Experts Panel on Designing Successful Conservation and Development Interventions at the Wildlife/Livestock Interface: Implications for Wildlife, Livestock, and Human Health, *AHEAD* (Animal Health for the Environment And Development) Forum, IUCN Vth World Parks Congress, Durban, South Africa, September 14th and 15th, 2003.

removing barriers to wildlife and livestock movement therefore has major implications for animal health and disease control strategies within the TFCA. It could also have wider implications for disease control in the three countries concerned. The GLTFCA covers land of diverse tenure and use in all three countries and, because of the large “edge effect” within each country, the animal health and land management strategies within the TFCA will have major implications for livestock disease control, production and export markets in each country. The animal health issues, coupled with very high expectations on the part of nearly all stakeholders for development benefits from wildlife based tourism, provide a unique opportunity for targeted interdisciplinary research to contribute to meeting these expectations. The development of a TFCA over such a large landscape also provides an exceptional opportunity to conduct research at the interface between wildlife, livestock, human communities and varied social-ecological systems in terms of health and the provision of ecosystem goods and services; and in so doing to work towards sustainable improvements in human health and livelihoods from local to regional scales. Furthermore, there is the opportunity, if not the necessity, to establish a R&D framework that establishes a synergistic partnership between farmers, natural resource managers and researchers on one hand, and government and non-governmental agencies involved in animal and human disease control, conservation, agriculture and rural development on the other.

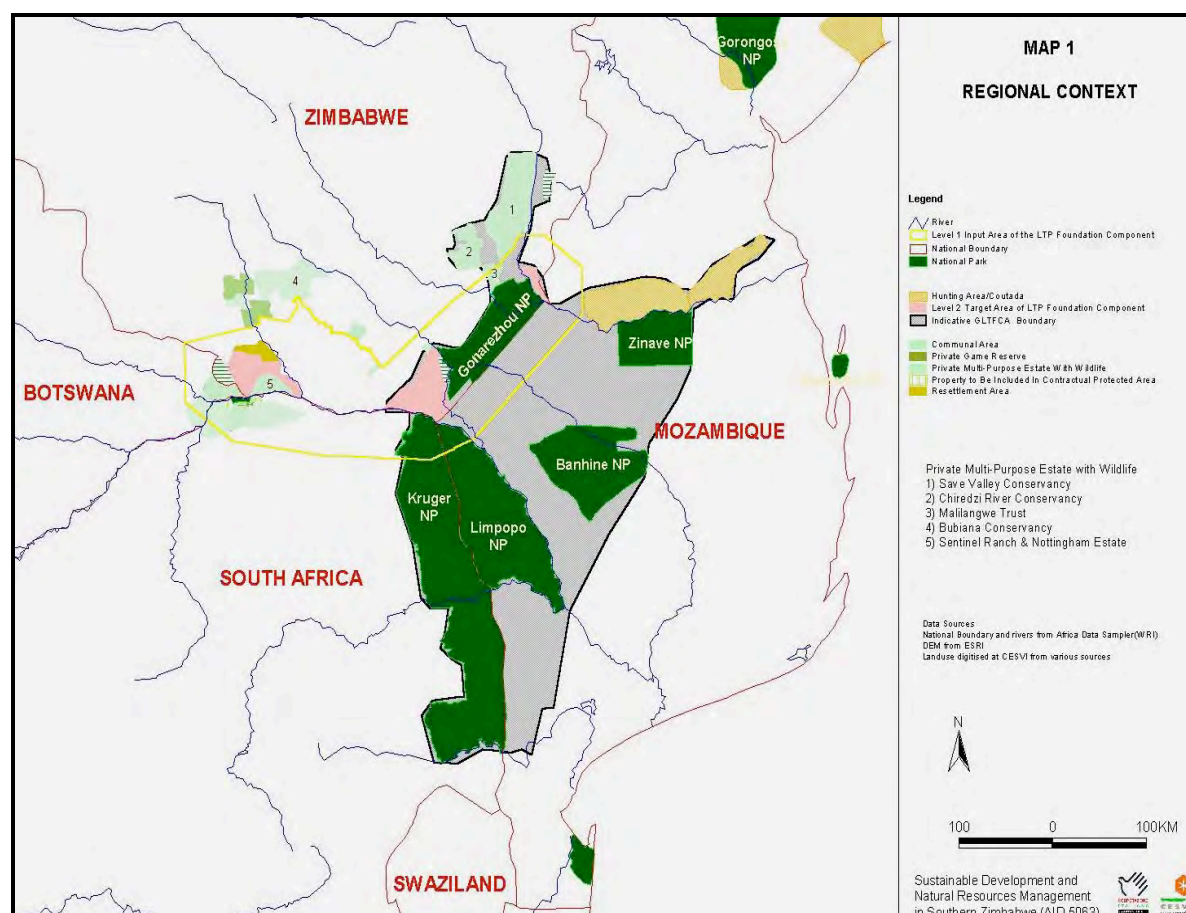


Fig. 1. Map of part of southern Africa showing the juxtaposition of Botswana, Zimbabwe, Mozambique and South Africa, and the locations of the Greater Limpopo TFCA and the Shashe-Limpopo TFCA to the west. (Source: CESVI Southern Lowveld Project)

While this initiative could have been developed as a series of conventional veterinary research projects or as a standard animal health program, the *AHEAD*-GLTFCA Working Group believes that the innovative, adaptive and long term solutions required are more likely to be reached through an inter-disciplinary R&D programme. Such a programme would need to be strongly participatory and actively involve farmers, resource managers and development partners in a comprehensive social-ecological systems approach to the interface between animal health, ecosystem goods and services, and human livelihoods and health. The theme of the initial *AHEAD* (*Animal Health for the Environment And Development*) Forum at the World Parks Congress in Durban was one of addressing real world needs from a regional basis, with an emphasis on research priorities being very much targeted at solving management problems

2. Background and assumptions

The need to develop a concept paper and subsequent proposals for an integrated research, conservation, and development program originated during a working group session at the *AHEAD* Forum, held in Durban during September 2003 under the auspices of the Wildlife Conservation Society, the IUCN, and a consortium of partners. The working group identified the Greater Limpopo and Shashe-Limpopo Transfrontier Conservation Areas (TFCAs) as priority areas in southern Africa for research and development at the interface between wildlife, livestock, ecosystem and human health. The working group also emphasized that the animal health problems identified during the working sessions required a broad, integrated approach to research and management of animal diseases (including zoonoses) that should be closely linked to rural development, land use and livelihood issues. A meeting of an expanded version of the *AHEAD*-GLTFCA Working Group held in Pretoria on the 7th November, 2003 reinforced the need for such an approach - one which was perhaps mirrored earlier in the *Pilanesberg Resolution* adopted by a joint meeting of the Wildlife Disease Association and the Society for Tropical Veterinary Medicine at their joint meeting in July 2001 (Karesh *et al* 2002). These organizations resolved to:

“... urge those organizations contemplating the funding and implementation of programs involving wildlife and livestock to:

- *Encourage projects that foster integrative approaches to livestock production, food security, human health, economic growth, democracy and governance, biodiversity conservation and natural resource management in order to build upon synergies among these sectors while precluding conflicting policies and/or negative impacts on either livestock or wildlife health;*
- *Formalize steps in their project design, environmental impact assessment, and implementation processes which address wildlife, livestock and rangeland health issues and their implications for sustainability and thus success, recognizing that these projects may alter fundamental relationships between animal hosts and potential pathogens and parasites;*
- *When contemplating projects involving domestic and/or wild animals, establish relationships with appropriate wildlife and domestic animal health oriented organizations and recognized local, national, regional and international experts, thereby identifying an appropriate pool of professionals who can assist in ensuring the inclusion of timely, science-based advice in planning, implementation, and monitoring processes; and*
- *Put a premium on local human capacity building to address the long-term technical needs of development activities that require expertise in domestic animal health and wildlife health by building adequate support into project design and implementation so as to engage local expertise and to foster capacity building at professional as well as community levels as a first-tier priority within and beyond the life-spans of such programs.”*

The proposal emerging from these working sessions and meetings is influenced in part by the following propositions/assumptions:

1. The development of major transfrontier parks and surrounding and/or intervening transfrontier conservation areas in southern and eastern Africa is a reality. These often very large areas of mostly agriculturally marginal land are expected to facilitate freer movement of wildlife (and possibly livestock) across differing land use and tenure regimes. Infrastructural constraints, such as fences and other barriers to the movement of animals, are likely to be minimized in establishing viable corridors linking areas of high wildlife-based tourism potential. Areas of intensive agriculture (e.g. irrigation schemes) may have to become physically isolated islands in a matrix of land uses increasingly based on the sustainable exploitation of biodiversity (Walker 1999, Cumming 1999a, 1999b).
2. The GLTFCA is seen as a *complex system* and a predominantly *systems approach* will be taken in developing the R&D programme. Such an approach recognizes that social-ecological systems (SES) are closely interlinked and that treating them as separate ecological and social systems, or as separate sectors, for the purposes of research and management is largely artificial and likely to perpetuate past resource management and development failures (Gunderson and Holling 2002; Ostrom and Janssen 2002).
3. The evolution of these large TFCAs and the coupled social-ecological systems (SES) they incorporate will result in benefits and losses (tradeoffs) between their various components. Wild and domestic animal health, the sustainable delivery of ecosystem goods and services, and associated human health issues, will form an important component of this dynamic development.
4. Command and control resource management and development approaches (often driven by narrowly focused, single discipline research) that result in natural resource management pathologies (Holling and Meffe 1996; Ostrom and Janssen 2002; Biggs 2003) are inappropriate for the SES within the GLTFCA. Such systems behave as complex adaptive systems with non-linear, essentially non-predictable dynamics (Gunderson and Holling 2002). Participatory and inclusive R&D approaches that are also inter-disciplinary and recognise the complexity of the SES comprising the TFCA will be essential.
5. Both government and non-governmental agencies are involved in implementing development and conservation in the TFCA area. A key requirement will therefore be to work with farmers, resource managers and development and regulatory agencies. It will also be necessary to conduct research that is continually informed by, and is responsive to, their problems. In this way research, provided it is at the right scale (Dalgaard, Hutchings and Porter 2003), is most likely to inform and influence resource management policy and practice (Getz *et al* 1999; du Toit, Walker and Campbell 2004).
6. The program will involve a mix of normal science (*sensu* Kuhn 1970), standard hypothetico-deductive science (a science of parts – Popper 1959), integrative inductive science (a science of wholes – Wilson 1998; Gunderson and Holling 2003) and post normal science (science that deals with uncertainty - Funtowicz and Ravetz 1993, 1994; Ravetz 1999). The term “research” is used here in the broad sense of increasing knowledge and understanding and includes monitoring and surveillance, integral components of the type of programme needed

3. Project objective and justification

The overall *objective* for a program comprising an integrated set of projects can be phrased in development terminology along the following lines:

Facilitate development and conservation success in the GLTFCA through integrated understanding based on innovative inter-disciplinary applied research, monitoring and surveillance at the interface between wild and domestic animal health, ecosystem goods and services, and human livelihoods and wellbeing

Justification.

The overall objective and the focus on R&D in this programme is justified by the magnitude of wildlife-livestock disease issues in the future development of sustainable land uses, transboundary natural resource management, biodiversity conservation and human livelihoods in the marginal lands of southern Africa in general and in the GLTFCA in particular. Some 65% of southern Africa⁴ is semi-arid to arid where extensive livestock and wildlife production systems are the most suitable and potentially sustainable forms of land use. The need to arrest desertification and enhance the capacity of these marginal areas to generate wealth and sustain improved human livelihoods is of paramount importance to the region.

During the period 1961 to 1994 cereal production *per person* declined by nearly 30% while protein (meat and milk) production declined by more than 50% in southern Africa (Cumming 1999b) resulting in much of the region becoming net importers of food. Livestock populations reached a ceiling in about 1987, by which time the number of humans surpassed the number of livestock units. Meat and milk production per animal and per person for the region is about 1/25th of the production levels in Europe (Cumming 1999b). Given these alarming trends and comparisons, the need to produce greater wealth from marginal lands through alternative enterprises such as high valued wildlife based tourism is clear. Furthermore such service-orientated generation of wealth, which is also partly decoupled from primary production and the vagaries of drought, is likely to generate greater employment opportunities in marginal lands. However, because the tourism sector is also subject to the vagaries of world markets the need to maintain a diversity of production systems (i.e. irrigated agriculture, wildlife and livestock) in arid lands is likely to remain paramount.

Whatever the potential of wildlife based tourism to generate wealth in areas such as the GLTFCA, the current reality is that small scale agro-pastoralists living in the adjacent communal lands depend greatly on livestock for their livelihoods (Cumming 2004). The need to balance their livelihoods and environmental security with the development of alternative land uses and opportunities gives rise to a very complex set of development issues. A central focus of these issues, and one that provides a unifying theme across sectors and disciplines, is that of animal, human and environmental health –“One Health”– which is the focus of this proposal. Innovative and integrated approaches to disease and natural resource management based on sound knowledge and understanding are urgently needed. An integrated, interdisciplinary programme such as is proposed here offers the most promising route forward in tackling these issues. It is a programme that the region can ill afford to do without.

The research outputs and deliverables required to achieve the programme’s overall objective are most easily cast as a set of themes and modules within an overall program as follows:

4. Themes and modules

⁴ Here southern Africa includes Angola, Zambia and Tanzania, and the countries lying to the south of them.

A framework of six main **themes** is proposed for the programme, namely,

- g. An overarching conceptual framework to facilitate integrated interdisciplinary work
- h. Animal health and disease
- i. Land use, ecosystem goods and services, and animal health
- j. Human livelihoods, animal and ecosystem health
- k. Policy support and capacity building at local, national and regional levels
- l. Communications and outreach

Within each of these themes three to five **research modules**, that include monitoring and surveillance, are defined. They will contribute to improved knowledge and understanding of the linked social-ecological systems that comprise the TFCA and the central role of animal, ecosystem and human health in these systems.

Theme #1. Overarching conceptual model/framework.

Develop an overarching conceptual or framework of the TFCA social-ecological system (SES) that provides a basis for a common, interdisciplinary, and generally agreed understanding of how selected system components (i.e. animal and ecosystem health and human livelihoods) are linked and interact. This framework, comprising a range of linked conceptual models, provides an essential basis for building a common vision amongst proponents engaged in the project/program and a platform for participatory interaction between researchers, farmers, resource managers, implementing agencies and policy makers. The conceptual framework should also assist in defining core, as opposed to peripheral, research questions and projects within the program. A core model should describe historical, existing and potential future alternative system states, and shed explicit light on driving variable thresholds that may be crossed in reaching such states. In particular, the ease with which these thresholds are reached and the desirability or otherwise of doing so, should contribute to a resilience (or vulnerability) analysis of the social-ecological systems in the GLTFCA. Some key issues such as water resources and land tenure and resource access rights that may not be tackled directly in other modules may need to be addressed in this theme.

Theme #2. Animal health and diseases

Develop a set of animal health modules covering the following:

- a. **Epidemiological studies** of key livestock and wildlife diseases in the TFCA with the following three main components: i) surveillance – including that of alternative and potential cryptic hosts, ii) monitoring, and, iii) developing spatially explicit epidemiological models that can be used to explore disease ecology through alternative health management and disease control/containment strategies.
- b. **Alternative animal health management and disease control strategies** using surveillance and monitoring data, and models developed in epidemiological studies; examine the biological, social and economic implications of alternative strategies.
- c. **Theoretical studies** that might open up novel approaches to managing wildlife and livestock diseases, and the interface between domestic and wild animals, with particular emphasis on such issues as, i) impacts of anthropogenic interventions (e.g. fences, water points, introducing new livestock breeds, disease control interventions)

on host–parasite population dynamics in wildlife and livestock, and, ii) impacts of interventions and system shocks (droughts, floods, epidemics) on host-parasite-pathogen dynamics (e.g. incidence, virulence, enzootic stability, competitive displacement of pathogen strains) in wildlife, livestock and multispecies populations or systems.

There will need to be strong linkages and feedback loops between these modules and sub-modules as well as between researchers engaged in this work and the regulatory and implementing agencies that are responsible for controlling and managing diseases in each country and the region. A key player in this arena will be the Veterinary sub-committee of the Joint Management Board of the GLTFCA.

Theme #3. Land use, ecosystem goods and services, and animal health

Social-ecological system dynamics in the GLTFCA area are strongly influenced by cycles of dry and wet years. These have influenced predator prey dynamics (Starfield and Bleloch 1991), declines in rare and endangered antelope species (Ogutu and Owen-Smith 2003), shifts in landuse from ranching to wildlife (Du Toit 1994), and cycles of food aid and human social dynamics. They are also likely to strongly influence spatial and temporal dynamics of diseases in the GLTFCA area and beyond (e.g. Randolph 1997; Hay *et al* 2002). There is therefore a clear need to develop a set of modules that include the following:

- a. **Exploring spatial and temporal relationships between ecosystem processes and disease prevalence** and virulence in the TFCA with particular emphasis on spatial and temporal distribution, patch dynamics (heterogeneity) and source-sink dynamics⁵ of large mammals, vectors and pathogens.
- b. **Examining landscape level resource use and impacts by wild and domestic ungulates on ecosystem goods and services** (which may have implications for (a) above and in turn be influenced by spatial and temporal dynamics).
- c. **Determining the effect of land use scale and pattern on animal health.** Explore questions relating to the scales at which enterprise/landuse units operate (e.g. size of farms, communal areas, village areas) within the TFCA and the extent to which their patterns and scale may influence animal health and disease control or mitigation strategies, and impact on ecosystem goods and services and human livelihoods.
- d. **Examining linkages between animal and human health.** Examine links between animal and human health and potential zoonoses (e.g. bovine tuberculosis, brucellosis) with particular reference to the interaction between zoonoses and HIV-AIDS.

⁵ Source sink dynamics – ecological communities are generally open and heterogeneous in space and time (i.e. they are patchy) with the result that organisms move between patches of habitat of varying quality. Patches of high quality habitat may be characterised by population growth and emigration (i.e. sources) while poor quality habitats may experience negative population growth despite immigration with the result that they act as sinks. The population fluxes involved between sources and sinks is referred to as source-sink dynamics. (Kristan 2003, Loreau and Holt 2003)

- e. **Understanding animal husbandry practices.** Examine current practices particularly in relation to disease prevention and problem animal control in order to explore the development and introduction of mitigating strategies early on. Many animal husbandry practices are deeply rooted in cultural tradition and their origins and usefulness under past and current conditions need to be understood if there is a need for them to adapt to evolving management systems within the TFCA.

Theme #4. Human livelihoods, animal and ecosystem health

Develop a module that explores linkages between animal and ecosystem health and human livelihoods – particularly in communal farming areas within the TFCA. Sub-modules would include the following:

- a. A **scenario planning**⁶ module that uses appropriate participatory procedures to explore current states and alternative futures for land use and development within the TFCA with particular emphasis on opportunities for building synergistic linkages between major land use options such as wildlife tourism, agro-pastoralism and irrigation. This module will have strong links to Theme #5 on policy support.
- b. Examine economic, social and ecological (including health) consequences and trade offs of alternative models for linking (integrating) land use enterprises across the landscape.
- c. Examine the effects of existing and alternative policy and institutional structures (and strictures) on the development of desirable scenarios/futures that may emerge from (a) and (b) above, with particular emphasis on scale effects and resilience and adaptive capacity.
- d. Develop a minimal (baseline) set of indicators, and appropriate thresholds for each, for monitoring animal, ecosystem and human wellbeing within the TFCA that can be used and sustained beyond the life of the project.

Theme #5. Policy support and capacity building at local, national and regional levels.

The results of monitoring, surveillance and research will have important implications for the development of policy and protocols related to a wide range of animal, human and ecosystem health issues. It will therefore be important to establish the capability to provide support to policy makers at various levels. Two related activities are envisaged under this theme:

- a. Facilitate and provide support to local, national and regional (including SADC) needs in the development of policy related to animal health and the linkages between animal and human health and ecosystems.
- b. Explore likely consequences of alternative policies using **scenario planning** and related planning approaches. See also module (a) under Theme #4.
- c. Facilitate the growth of adequate capacity to achieve and maintain (a) and (b).

⁶ Scenario planning – a participatory planning technique that formally and explicitly examines plausible alternative future states of a social-ecological system – futures that could be. They represent alternative dynamic stories that include qualitative and quantitative descriptions of the system and capture key ingredients of our uncertainty about the future (e.g. Peterson, Cumming and Carpenter, 2003)

Theme #6. Communications and outreach

If the research program is to have any effect on the ground it will require an effective and appropriately supported communications and outreach program that caters for the following:

- a. Communication between research workers and the array of organizations involved in the program.
- b. Communications and information flow between scientists and governmental implementing and policy making agencies linked to and/or supporting the program.
- c. Participation of landowners, communal farmers, local government agencies and individuals in the research program.
- d. Support for the development of mechanisms that foster the spread of information and learning on new developments in resource and disease management (e.g. exchange visits between resource managers within the TFCA) and so contribute to enhanced adaptability and resilience in the social-ecological systems of the TFCA.
- e. Production and distribution of research results, syntheses, policy briefs, etc.
- f. Community and village outreach including theatre linked to meetings and participatory rural appraisal approaches to communicate information to and receive input from communities and villages where a high proportion of stakeholders are not literate.

It is particularly important for this module to be seen and developed as a core module that, together with Module #1, provides the “glue that holds the programme (i.e. themes and modules) together” and helps to build participation and capacity of all stakeholders involved. *It must be started early in the programme, to facilitate adequate constituency building.*

4. Context

Animal health and livelihood problems in the TFCA are a function of current environmental and socio-economic conditions and an outcome of developments in the region over the last 150 years. A brief overview of past and recent developments in relation to animal health and disease control provides a necessary background and context in which to examine the current animal health, land use and development issues in the GLTFCA.

Historical

Livestock arrived in southern Africa between 2000 and 1500 years ago (Denbow and Wilmsen 1986) from East Africa and were certainly present in the Limpopo valley from about AD 600 (Plug 2000). The earliest identified archaeological site (known as *Pa 8.1* near the Luvuvu/Limpopo confluence) occupied in c. AD 850 contained the remains of sheep and goats, eleven wild ungulates, but no cattle. Later sites in the same area, such as Thulamela, (c. AD 1350-1750) included cattle, sheep, goats, dogs and chickens and the remains of 32 non-domestic mammals (Plug 2000). The collapse of the Mapungubwe culture in about 1100 AD and the subsequent shift to

Great Zimbabwe was associated with changing climate and the development of smaller settlements, possibly intermediary chiefdoms, at several sites in the Limpopo, Lundi, Mwenezi, Save and Bulye valleys in Zimbabwe (Manyanga, Pikirayi and Ndoro 2000), with sites such as Malumbu in the Mateke Hills near the Bulye River, and others near Chiredzi. The Malumbu site (*c.* AD 600- 1000) in the Mateke Hills, for example, exploited mainly cattle and sheep and/or goats with little use of wildlife while the Mwenzi Farm site (AD 800-1300) exploited a greater proportion of wild ungulates and particularly zebra, wildebeest and impala (Manyanga, *et al* 2000). The important point about the archaeological findings for the Limpopo Valley in sites within or bordering the GLTFCA and the S-LTFCA is that domestic livestock were present alongside wildlife, which was exploited, within the area for at least 1000 years before the advent of introduced (*i.e.* alien/exotic) livestock diseases *c.* 150 years ago and European settlers in the Lowveld 90 to 100 years ago.

The major external shocks to both livestock and wildlife in the mid to late 1800s were in fact from introduced diseases – often carried by animals imported from other countries or elsewhere in Africa. The most serious of these introduced diseases were rinderpest and contagious bovine pleuropneumonia. Bovine pleuro-pneumonia had a major impact on cattle populations in the 1850s and later (Roberts 1980), while rinderpest decimated both domestic livestock and wild ungulates during the 1890s. Subsequent introductions followed, such as strains of East Coast Fever from East Africa, the rabies street virus from Europe, bovine tuberculosis, schistosomiasis, brucellosis, and more recently a novel FMD topotype, or strain, from northwestern Zimbabwe was introduced when buffalo were translocated from Hwange and Chizarira National Parks to Gonarezhou National Park in the late 1990s. The ecological impacts of the devastating epidemics of rinderpest, and possibly also pleuropneumonia in cattle, are still evident a century later (Caron, Cross and du Toit 2003).

The collapse of both domestic animal and wildlife populations in the 1890s and early 1900s had major implications for livelihoods and food security in the GLTFCA area. It also probably prompted, and perhaps indirectly facilitated, the movement to establish game reserves in the more remote areas with low human densities and depleted livestock populations such as the Gonarezhou (Zimbabwe) and Kruger (South Africa) National Parks.

The three countries represented in the TFCA differ considerably in their colonial and post independence history and current economic status. There are, however, some common experiences that influenced land use and livestock/wildlife management in the GLTFCA area. After colonial occupation and coinciding with the final partition of Africa in 1912 (Pakenham 1992), the rural areas encompassed by the TFCA were subjected to land apportionment acts in South Africa and Zimbabwe (then Southern Rhodesia) that resulted in the transfer of land to commercial (mainly white) farmers or to game reserves and eventually to national parks. Adjustments to land category boundaries and the consequent displacement of rural, largely subsistence, farmers occurred intermittently through to the 1970s (*e.g.* extension of Gonarezhou following the clearance of tsetse fly in 1975 and extension of Kruger NP to include the Pafuri Game Reserve in 1969, [Pollard, Shackleton and Carruthers 2003]). In Mozambique, however, the establishment of Zinave and Banhine National Parks and Coutada 16 in 1972, and transformation of the latter into the Limpopo National Park in 2001, did not involve the displacement of people living in these areas.

Despite the relative neglect of the marginal areas now comprising the TFCA from a development perspective, animal disease control through coordinated national policies was effective until about the mid-1970s. A joint tri-national tsetse control program, for example, was concluded in the early 1970s with the removal of tsetse fly from the south-east Lowveld of Zimbabwe and from the

area of Mozambique south of the Save River (Robertson and Kluge 1968, Robertson *et al* 1972). The program prevented the re-invasion of Kruger NP by tsetse fly. The resurgence of tick-borne diseases in south-east Zimbabwe followed the onset of the guerilla war and collapse of dipping services in the mid 1970s (Norval – undated, Tice *et al* 1998).

Current situation and animal health concerns

Within Zimbabwe disease control measures were re-established after independence with European Union support, particularly for FMD, but these measures have largely collapsed again over the last three years and there is also evidence of a return of tsetse fly to the Save-Rundi junction area of the Gonarezhou National Park.

Apart from information on the control of tsetse fly during the 1970s, and some recent information on the spread of the fly, no published information appears to be available on animal health and diseases in the Mozambique sector of the TFCA.

The animal health and disease situation in the South African component of the TFCA, the Kruger National Park, has been well studied and documented (e.g. Bengis *et al* 2003). Major current concerns include, for example, the northward spread of bovine tuberculosis (BTb) within the park (Bengis *et al* 2003, Caron *et al* 2003).

Table 1. Animal diseases of concern in the GLTFCA (** Priorities for surveillance and strategic control/containment: *Origin* indicates whether the disease is indigenous (Ind) or introduced/alien (Al)

Mode of Transmission	Disease	Origin	Wildlife	Domestic animal	Human	Comments
Contagious	Rinderpest	Al	+	+	-	Last Outbreak in 1896
	Foot and Mouth Disease**	Al	+	+	-	New strain from Zambezi Valley introduced 2000
	Malignant catarrhal fever	Ind	+	+	-	
	Brucellosis	Al	+	+	+	
	Bovine tuberculosis**	Al	+	+	+	
	Anthrax	Ind	+	+	+	
	Rabies	Ind	+	+	+	
	Canine distemper	Al	+	+	-	
	Toxoplasmosis		+	+	+	
	Sarcoptic mange		+			
Vector borne	Trypanosomiasis**	Ind	+	+	-	No human cases south of Zambezi Valley
	African Swine fever	Ind	+	+	-	
	African horse sickness	Ind	+	+	-	
	Rift Valley fever (Theileriosis)	Al	+	+	+	
	Heartwater	Al	+	+		
	Echinococcosis	Ind	+	+	+	

The animal health issues presently of greatest concern (Table 1) are the breakdown of FMD controls in Zimbabwe and its spread (including novel strains of FMD) within the south eastern sector of the country, the possible re-invasion of tsetse fly, the spread of BTb in Kruger and its possible entry into Zimbabwe as well as its status in Mozambique. Rabies has been documented on the Mozambican side of the TFCA, for example, but never in wildlife in Kruger National Park. Other current important disease concerns are also indicated in Table 1.

Key environmental features

Both the GLTFCA and the S-LTFCA are characterized by low altitude (< 600m a.s.l.) and high mean annual temperatures. Mean annual rainfall varies between 250-600mm and is highly variable both temporally and spatially. The region is repeatedly subject to severe droughts. Geologically the area is dominated by Karroo sediments and basalts with dolerite and diabase sills and dykes. The basalt derived soils are generally nutrient rich while sandy soils are mostly nutrient poor. Large areas are characterised by very poor shallow and rocky soils with no agricultural potential (Anderson *et al* 1993). Plant production is constrained in both soil types by moisture and particularly by the short growing season (< 120 d but with much of the area at <90 d) coupled with a long dry season. Low and intermittent winter rainfall does occur and is particularly important for grass growth and nutrition of some ungulate species (Ogutu and Owen-Smith 2003; Dunham, Robertson and Grant 2004). The area is agriculturally marginal and unsuited to dry land cropping. Areas of irrigable soil are present and several large existing or potential commercial irrigation schemes fall within the area. The most suitable form of land use is generally recognized to be extensive livestock and/or wildlife production (Jansen, Child and Bond 1992).

Development and food security

From a development perspective, the GLTFCA area has in the past been regarded as disease ridden, marginal and largely unproductive land on distant national boundaries, with the result that infrastructural development has, until recently, been minimal. Human population densities in Zimbabwe and Mozambique are generally below 20 people per km² but when examined in relation to rainfall and primary productivity without external energy inputs (as in commercial irrigation) they are too high – particularly in the subsistence agro-pastoral farming areas in the Communal Lands in Zimbabwe (Cumming 2003). In South Africa, however, human population densities in the communal lands on the western boundary of Kruger NP vary between 150-300 people per km² (Pollard *et al* 2003). These high densities are not supported by the local natural resource base but by remittances from wage labour in the cities. In south eastern Zimbabwe food security for subsistence farmers is very low with surplus cereals being reaped in less than one year in ten (Frost 1999), and dependence on livestock is high.

Socio-economic features

Mozambique, although still emerging from a protracted and damaging civil war that ended a decade ago, has the highest economic growth rate in the region. The Masengena and Chikwarakwara Districts in Gaza Province, however, have little infrastructure and are poorly developed. The national parks within the TFCA (Limpopo, Banhine and Zinave) are essentially undeveloped.

The South African transition from apartheid to democratic representative government occurred in 1994. Tourism has been a major growth industry, and Kruger National Park with its well developed infrastructure attracts about 1 million tourists a year. Tourist developments in game ranches and conservancies on the western boundary of the park also attract high numbers of tourists. The communal lands are however densely settled and underdeveloped and face major social and resource management problems (Pollard *et al* 2003).

Zimbabwe gained independence in 1980. After nearly 20 years of relative stability and economic growth the country has, since 2001, experienced rapid economic decline - reputedly the fastest in the world. This period has coincided with a fast track land reform program that has had

major impacts on the viability of the commercial farming and wildlife-based tourism sectors in the south east Lowveld of Zimbabwe. The Gonarezhou National Park is largely undeveloped as a tourist destination but adjacent conservancies still support some “low volume- high value” tourism.

Wildlife policy and management

Broad policy guidelines, in keeping with the SADC Wildlife Protocols, are in place for the GLTFP but not for the TFCA⁷. The Joint Management Committee for the TFNP has drafted a management plan but this has yet to be finalized and ratified. The Joint Management Board for the Great Limpopo Transfrontier National Park is advised on animal health and disease matters by a Veterinary Subcommittee of its Conservation Committee.

The major differences between the participating countries in technical capacity and resources in the fields of conservation and veterinary services presents a major challenge in the development of the TFNP and the TFCA, and this factor will need to be considered in the development and implementation of this project.

Animal health policies

There does not appear to be an existing formal policy on animal health and disease control for the GLTFCA or for any of the other TFCAs being developed. This perhaps makes the *AHEAD*-GLTFCA initiative that much more important and exciting as a potential model.

6. Programme coordination, participants and budgets

At the outset it will be important to establish clear lines of communication between the project and its various research components and the veterinary, community health and rural development authorities in each country. It will also be important to alert them at an early stage of plans to develop this proposal and to secure their support. This might best be accomplished by members of the working group meeting with senior officials in the relevant agencies within each country to outline and seek comment on the concept. At an early stage the Veterinary Sub-Committee of the GLTFNP Joint Management Board needs to be informed – perhaps through members of the *AHEAD*-GLTFCA Working Group who are members of the Veterinary Sub-Committee.

For an inter-disciplinary and multi-agency initiative such as this, mechanisms for effective coordination and communication amongst all stakeholders will need to be carefully designed and planned – and adequately resourced. The programme will need an “institutional home” and the formal establishment of a consortium comprising a core group of agencies who will be responsible for raising and managing funds and generally managing the programme.

The following is a preliminary list of organizations and groups that could potentially be involved and participate, even if only peripherally, in the program.

1. Veterinary departments of Mozambique, South Africa and Zimbabwe

⁷ Note that GLTFNP refers to the Transfrontier National Park that comprises Kruger, Limpopo and Gonarezhou National Parks and the Sengwe Corridor (that has still to be established) to link Kruger and Gonarezhou. The TFCA refers to the much larger complex of National Parks (including Banhine and Zinave), game reserves and conservancies on freehold land and the intervening communal farming lands on state land, etc.

2. The government wildlife conservation and research agencies, TFCA Committees, and national parks in the three countries involved.
3. The government agricultural/livestock extension agencies
4. The Universities of Pretoria (Centre for Wildlife Studies – an inter-faculty body), Natal (Institute of Natural Resources), Zimbabwe (Centre for Applied Social Sciences, Institute of Environmental Studies, Tropical Resource Ecology Programme), University of Eduardo Mondlane veterinary faculty, and several university research groups from Europe and North America (e.g. University of California (Berkeley) Dept. of Environmental Science, Policy & Management, which is already working in Kruger).
5. NGOs, including the Wildlife Conservation Society (WCS), Peace Parks Foundation (PPF), CESVI- Cooperazione e Sviluppo, World Wide Fund for Nature – Southern Africa Regional Office (WWF-SARPO), African Wildlife Foundation (AWF), and Fauna Natureza um Perigo (FNP) in Mozambique.
6. Conservancies in South Africa and Zimbabwe
7. Public health authorities and health-related NGOs
8. Local government authorities in the districts that are part of the TFCA
9. Resource managers and farmers on the ground (i.e. on freehold and communal lands) within the TFCA.

Budgets

A detailed budget for the programme has yet to be developed. However, a start up phase building a common framework, establishing local and regional linkages, and tackling some of the more immediate disease surveillance and monitoring work in GLTFCA could be accomplished with a budget of between US\$ 0.75 and 1 million. A programme with all modules operating at a realistic level would probably require in the region of US \$12 million a year. However, many of the sub-modules could be funded separately and provided that essential core themes such as a unifying conceptual framework and a communications and outreach programme were in place, the project could still achieve the aims of a targeted and integrated applied research and development programme.

A multifaceted research and development programme of this nature with wide applicability and of high potential interest to policy makers at national and international levels will clearly require the formation of a consortium of appropriate implementing partners and supporting agencies. The formation of such a consortium, which would include development and implementing partners in both public and private sectors, is under active consideration

7. References

Note: The following list includes both literature cited and literature consulted but not cited.

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Animal Health for the Environment And Development

Possible Applications in Namibia?



Introductory Workshop

Ministry of Environment and Tourism (MET)

29 November 2005, Roof of Africa, Klein Windhoek
Facilitator: David Cumming (AHEAD GLTFCA Regional Coordinator)

Animal Health for the Environment And Development (AHEAD) WORKSHOP PROCEEDINGS



This workshop was organised by the Ministry of Environment and Tourism (MET) in collaboration with the Wildlife Conservation Society (WCS), and was funded by the Strengthening the Protected Area Network (SPAN) Project.

For further information, please contact:
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ACRONYMS AND ABBREVIATIONS

AHEAD	Animal Health for the Environment And Development
BMCF	Bovine Malignant Catarrhal Fever
CBD	Convention on Biological Diversity
CBNRM	Community-Based Natural Resource Management
CBPP	Contagious Bovine Pleuro-Pneumonia
CITES	Convention on International Trade in Endangered Species of Flora and Fauna
CKGR	Central Kalahari Game Reserve
FMD	Foot and Mouth Disease
GLTFCA	Greater Limpopo Transfrontier Conservation Area
HIV-AIDS	Human Immunodeficiency Syndrome – Acquired Immune Deficiency Syndrome
IDRC	International Development Research Centre
IUCN	International Union for the Conservation of Nature and natural Resources (The World Conservation Union)
KAZA	Kavango-Zambezi
MAWF	Ministry of Agriculture, Water and Forestry
MET	Ministry of Environment and Tourism
PA	Protected Area
PPF	Peace Park Foundation
SADC	Southern African Development Community
SPAN	Strengthening the Protected Area Network
TFCA	Transfrontier Conservation Area
UNFCCC	United Nations Framework Convention on Climate Change
WCS	Wildlife Conservation Society

SUMMARY

A one-day workshop was held on November 29th, 2005 in Windhoek. The objective of the workshop was to introduce relevant line ministry officials to the AHEAD concept and experience from existing AHEAD programme, as well as to yield some consensus and a way forward on this issue. For the purpose of developing an understanding of the AHEAD background, a number of presentations were given. These gave an overview of the status of animal diseases, the AHEAD programme, diseases in relation to conservation and livelihoods; as well as the progress made in sustaining animal and ecosystem health. Overall animal disease issues in Namibia were discussed at the workshop, as well as the possibility of starting the AHEAD approach in Namibia, given the current situation. Finally the potential stakeholders of AHEAD in Namibia were identified, whereby their roles/mandates and potential conflicts were highlighted.

To date, many animal diseases have been identified in Namibia. These are caused by pathogens, most of which are said to be emerging/re-emerging. Most of these pathogens are also responsible for causing human diseases. The identified diseases include: foot and mouth disease, rabies, anthrax, tuberculosis and avian influenza. Of the identified diseases, the foot and mouth disease is the most feared, as it has the greatest impact on land use. In addition, all mammals including human are susceptible to rabies. Other diseases are also said to be threatening animal health, but are said to occur in rare cases. Nevertheless, most diseases are of socio-economic importance and are shared between livestock, wild animals and human; therefore a multi-disciplinary approach is required to minimise the impact of such on animals and humans.

An initiative called Animal Health for Environment And Development (AHEAD) was then launched for the purpose of addressing animal health in relation to their environments. A major concern was the issue of animal diseases in relation to their ecosystems, and most importantly, transboundary wildlife management. The AHEAD initiative was started by the Wildlife Conservation Society, the IUCN Veterinary Specialist Group (VSG) and other partners after recognising the importance of animal health to both conservation and development interests. The idea is to promote the co-existence of people and wildlife, looking forward to sustainable livelihoods. AHEAD was launched at the World Park's Congress in 2003.

At the moment there are issues of concern at the interface of animal health and human livelihoods. Whilst there is boundary between Protected Areas (PAs) and people, and at the same time high dependence of rural people on livestock and environment for subsistence, a two-fold objective has been adopted i.e. poverty alleviation and increase in the potential to farm with livestock in communal areas. However, the role of animal health in conservation and agriculture needs to be redefined as it is now wildlife, livestock, human and vectors that are being dealt with. It is quite important to know how the infectious diseases spread between human and animals. The effect of climate change on vectors also needs to be investigated.

Several case studies have been conducted to investigate the animal and human health issues. Such studies have found a great need for more research, a shift in philosophies and attitudes as well as new approaches to livelihoods and resource use.

Looking at a broader picture, there are over 20 Transfrontier Conservation Areas (TFCAs) in the Southern African Development Community (SADC) region, with lack of research and suitable policies to address linkages between animal health and ecosystem health. For this reason there is a need to develop scientific approaches to contribute to the improvement of animal and ecosystem health and human wellbeing in the TFCAs across the SADC region. At this point the Greater Limpopo Transfrontier Conservation Area (GLTFCA) has prioritised the control of animal diseases across the national borders of the countries involved i.e. South Africa, Mozambique, Zimbabwe and Botswana.

The way forward is now to organise a workshop that involves a bigger group to look at research and development issues in a particular area of Namibia, to look at the benefits of wildlife to communities and to examine the wildlife-livestock interface.

The details of the presentations given at the workshop are presented in this report.

Animal Health for the Environment And Development (AHEAD): Possible Applications in Namibia?

Introductory Workshop

Date: 29 November 2005

Venue: The Roof of Africa, Klein Windhoek

Facilitator: David Cumming (AHEAD GLTFCA Regional Coordinator)

PROGRAMME

Background: *Although wildlife based tourism is a key for regional and national development in Namibia, management of wildlife and livestock diseases across protected areas (including envisaged transboundary conservation areas and neighbouring lands) remains unresolved and is an issue of major concern for both conservation and economic development. In addition, interactions at the interface between animal health, ecosystem services and human wellbeing are also poorly understood. It is therefore critical for MET and other relevant organizations such as the Ministry of Agriculture, Water and Forestry (MAWF) to become aware of wider implications of the diseases and methods for disease control in order to work towards improved and integrated management of animal diseases.*

Objective: *To introduce relevant line ministry officials to the AHEAD concept and experience from existing AHEAD programme, as well as to yield some consensus and a way forward on this issue.*

AGENDA

8h30 - 9h00	Registration
9h00 - 9h15	Introduction of the guests and all participants (Pauline Lindeque)
9h15 - 9h45	Trends of wildlife and livestock diseases in Namibia and current response procedures (MAWF)
9h45 - 10h15	Facilitated discussion – pros and cons of current practice
10h15 - 10h35	TEA Break
10h35 - 10h55	World Park's Congress and the AHEAD program (Mike Kock)
10h55 - 11h30	Overview of the AHEAD GLTFCA program (Dave Cumming)
11h30 - 12h00	Questions and Discussion of AHEAD approach
12h00 - 12h45	Diseases, conservation and livelihoods (Mike Kock and Dave Cumming)
12h45 - 14h00	Lunch
14h00 - 15h00	Facilitated discussion - Can the AHEAD approach enhance prospects for successful conservation and development in Namibia?
15h00 - 15h15	Tea break
15h15 - 16h15	Stakeholder analysis
16h15 - 16h45	Way forward
16h45	Closing

MORNING SESSION

1. *Welcoming Remarks and Background to AHEAD: Dr Pauline Lindeque*

- Dr Lindeque opened the meeting and welcomed everyone.
- She outlined the purpose of the workshop:
 - *provide a brief introduction to the Animal Health for the Environment And Development (AHEAD) approach ;*
 - *identify the potential stakeholders for the prospective AHEAD project in Namibia.*
- Defining AHEAD was thought to be important as there was limited understanding of this type of project in Namibia.
- The Strengthening the Protected Area Network (SPAN) project of the MET identified the AHEAD approach as a possible way forward to addressing the wildlife disease in Namibia.
- The Directorate of Scientific Services (DSS) is also very interested in looking at the AHEAD programme and possibly starting an AHEAD type project in Namibia, as it will help with the management of wildlife diseases.
- The AHEAD concept resulted from a 2-day interactive forum, at the IUCN World Parks Congress held in Durban in 2003, which captured a holistic and integrated approach that fits in well with Namibian approach; leading to sustainable development, and could also strengthen the Ministry's strategic planning process.
- Purpose of the workshop: information-sharing, hearing how AHEAD has begun to be implemented in other parts of Africa, how relevant to the Namibian situation it is, and to decide collectively if it is applicable in Namibia.
- Workshop organised by MET in collaboration with the Wildlife Conservation Society (WCS).

The floor was given to the workshop facilitator, **Dr David Cumming, Coordinator for the AHEAD Programme in the Greater Limpopo Transfrontier Conservation Area (GLTFCA)**

2. *PRESENTATION 1: Trends of wildlife and livestock diseases in Namibia and current response procedures – By Dr Otto Huebschle (Director: Veterinary Services, MAWF)*

So far, 1400 pathogens infecting humans have been identified, of which 13% are regarded as emerging/re-emerging; and many of such are animal-related pathogens. In addition, there is an increase in the number of new pathogens that are still emerging. The major ones of these are shared between livestock and wildlife are:

- **Viral diseases:** foot and mouth, rabies (well-known), malignant catarrhal, African swine fever, classical swine fever, avian influenza and the Newcastle disease.
- **Bacterial diseases:** anthrax, tuberculosis, Salmonella and Yersinia pestis.
- **Protozoal diseases:** trypanosomiasis and Theileria parva lawrenci. These are said to be limited, and mostly found in corridors in the Caprivi region, but have impacted on humans and animals.
- Foot and Mouth Disease:
 - Most feared and contagious
 - Buffalo are lifelong carriers, also kudu, impala and other antelope
 - Most common in east Caprivi
 - Characterized by a rapid spread, appearance of sores and blisters in the mouth, feet and udder, causing reduced mobility and feeding resulting in debility, reduced production and secondary infections.
 - Low mortality in adults, but high in calves - cannot infect people

- Control is said to be complicated in Namibia, however there are some complicated systems that are being used. Those include: strategic vaccination zoning, movement control, traceability, quarantine, surveillance and branding.
- Rabies:
 - All mammals, including man are susceptible.
 - Transmitted by saliva, through bites or mucous membranes.
 - Characterised by irreversible neurological changes that lead to death
 - Many rabies cases have been reported in northern Namibia, mostly in dogs, followed by cattle, kudu and goats.
 - Vaccination programmes expensive. They however only work well on some animals, for example, in foxes.
 - In Namibia, the jackal, bat-eared fox, honey badger and other wild carnivores are important in the transmission of the disease to domestic animals and other wildlife.
 - Dogs and cats are responsible for transmitting the disease to man and other domestic animals.
 - Just one vector can cause havoc
 - Vaccination is being prioritised.
- Bovine Malignant Catarrhal Fever (BMCF):
 - Infrequent, but easily diagnosed.
 - Blue and black wildebeest are maintenance hosts.
 - Infect cattle when in close contact, esp. calving season.
 - Recommended that farmers practising wildebeest farming should have double fence.
- African Swine Fever:
 - Highly fatal disease of domestic pigs.
 - Transmitted by soft tick.
 - Wild pigs and warthog are symptomless reservoirs of infection for domestic pig. Piglets easily pick up the disease.
 - Occurs in sporadic outbreaks in Namibia.
 - It is advised that pig sties have double fencing to avoid warthog to domestic pig contact.
 - Outbreak cases very few.
- Anthrax:
 - Soil borne bacterial disease.
 - Can affect humans, livestock and wildlife.
 - Spores of bacteria can last for decades in contaminated soil.
 - Recent outbreaks in Eastern Caprivi involving wildlife and cattle.
 - The anthrax spores can survive in the environment for up to 90 years, but animals that have been vaccinated are not affected.
 - Many anthrax cases resulted in cattle deaths in Katima Mulilo in 2004.
- Nagana:
 - Not necessarily in Namibia, but found in many parts of the Sub-Saharan region. Also found in Namibia in a small part of Eastern Caprivi covering an area of 2800 km².
 - Transmitted by Tsetse fly.
 - Controlled by the use of insecticide.
- Avian influenza:
 - Not yet diagnosed in Namibia.
 - Risks increased by threat of migratory birds – Some 3750 million birds enter sub-Saharan Africa from Europe and Asia each year (MacLean 1990). A very small

fraction of these (less than 1%) 37 million enter Namibia either as their final destination or in transit to the south and east (and on the return leg).

- 'Bird flu' viruses normally infect only birds, but also pigs, and rarely humans.
- Contagious in animals.
- Highly species specific.
- Spread of disease is a concern in Namibia as it is likely to experience mutation in birds.

CONCLUSION

A number of diseases of socio-economic importance are shared between livestock and game animals and some with human beings. A multidisciplinary approach is therefore required to minimise the impact of these diseases on wildlife, livestock and humans.

DISCUSSIONS

Rabies has been identified as one of the most threatening wildlife/livestock diseases that can be transmitted to humans. Have any cases of rabies been recorded in baboon populations?

- No, however only a fraction of cases are reported as no economic incentive for farmers

Which of these diseases have the greatest impact on land use?

- FMD

Are there predator control programmes for rabies?

- At the moment there are only vaccinations for dogs and cats, which are free of charge.
- There is a need to educate the farmers on priorities related to rabies vaccination. Cost of cattle loss vs. vaccination.
- In farming areas, jackal is the main vector.
- Potential for oral vaccine (e.g. Tunisia, C. Europe) but must first test a significant number of smaller carnivores in Etosha to vaccinate and the effects must be approved by the scientific community.
- Alternative methods like the muzzling of dogs in the 1950's eliminated rabies in Britain and Zimbabwe.
- CBPP not relevant to wildlife, only to livestock – although significant implications for wildlife due to fencing?

Discussion regarding moving the veterinary fence northwards!

- Erecting of fence without market benefit is of no use.
- Moving the 'red line' to the Angolan border would destroy the market immediately.
- The more reasonable thing to do is to maintain the fence as a safety mechanism to contain disease.
- Use of GPS, branding number per farm in the short to medium term, and then looking to remove fence in long term – 2010?

What is the state of the Kunene fence?

- At the moment, the new vet in Outjo is taking care of the fence.

Does the Kunene fence need repair?

- No – this is only apparent as elephants continually cause damage to the fence - constant process.

What is MAWF's attitude to the disease free buffaloes?

- Disease free buffaloes can fetch N\$ 150,000 per animal and many farmers would be interested in the high economic value. However, MAWF is not confident that every farmer could go through expensive and stringent procedure to ensure disease free status. The risk of jeopardising the farming industry below the Red Line is too great to risk at the moment. Therefore, MAWF would not want to engage in any discussion on introduction of disease free buffaloes.

Are there any adverse environmental impacts from FMD control?

- Negative impact of fencing is felt on the giraffe population, on fences, on buffaloes, and the animals require to be quarantined. However livestock are being protected.

Any critical analysis done on the red line?

- Not at this point. Overall, there are no major environmental impacts, perhaps, economic impacts.

What are the economic impacts – opportunity costs of excluding buffalo and wildlife tourism south of the red line?

- Rowan Martin's study shows good financial analysis of the value of buffalo in Caprivi but this still needs full economic analyses. Socioeconomic aspects need examination in greater detail. Requires fence that elephants can't break through!

3. PRESENTATION 2: *World Park's Congress and the AHEAD program - by Dr Mike Kock (AHEAD/WCS)*

Overview of Wildlife Conservation Society:

- Has been operating since 1895 at Bronx Zoo in New York, USA; with a commitment to save wildlife and wild lands across the world.
- Promotes the co-existence of people and wildlife in a sustainable way on both a local and global scale.
- WCS Field vet programme with 53 projects/offices around the world – 2 in Africa.
- Work done on Ebola virus.
- Looking at integrated human, wildlife and livestock health.
- AHEAD launched in 2003 – vets, ecologists, economists, wildlife managers etc. at a workshop in RSA, trying to develop an approach which is integrative towards development [See www.wcs-ahead.org].
- To look at animal health implications and how they relate to the wider landscape.
- TFCA initiatives are on the rise and AHEAD would like to look at animal disease in terms of ecosystem and transboundary wildlife management.
- Policies are at the moment not addressing the balance between animal and ecosystem health and human well being.

AHEAD themes:

- Animal health and Disease
- Ecosystem health
- Ecosystem goods and services (those contributing to quality of human life – such as solar energy, decomposition of waste, regeneration of breathable air, storage, purification and redistribution of potable water, etc. i.e., veterinarians have to broaden the sphere of work)
- Human livelihoods and well being

At World Park's Congress in 2003

Outcomes of AHEAD Forum workshop

Working Group 3 (GLTFCA and Shashe-Limpopo TFFCA):

- Disease and Protected Area management
- Health of wildlife and domestic animals are linked.
- Sustaining animal health is important for human livelihoods in the GLTFCA

[Note: The AHEAD Forum Working Group Notes are available at <http://www.wcs-ahead.org/workinggroups.html>]

4. PRESENTATION 3: *Diseases, Conservation and livelihoods – by Mike Kock and David Cumming*

Issues at interface of animal health and human livelihood:

- _ Boundaries between Protected Areas and people – this is the hard edge of protectionism.
- _ 80% of Africa's rural poor depend on livestock and the environment as a whole for subsistence.

A two-fold objective is adopted:

- **Alleviating poverty in Africa**
- **Increasing the potential to farm with livestock in communal areas.**

This approach needs a redefinition of the role of animal health in both conservation and agriculture. Complicated roles in the ecosystem: Wildlife, Livestock, Humans and vectors.

Fig. 1: Emerging and Re-emerging zoonoses, 1996 – 2000:

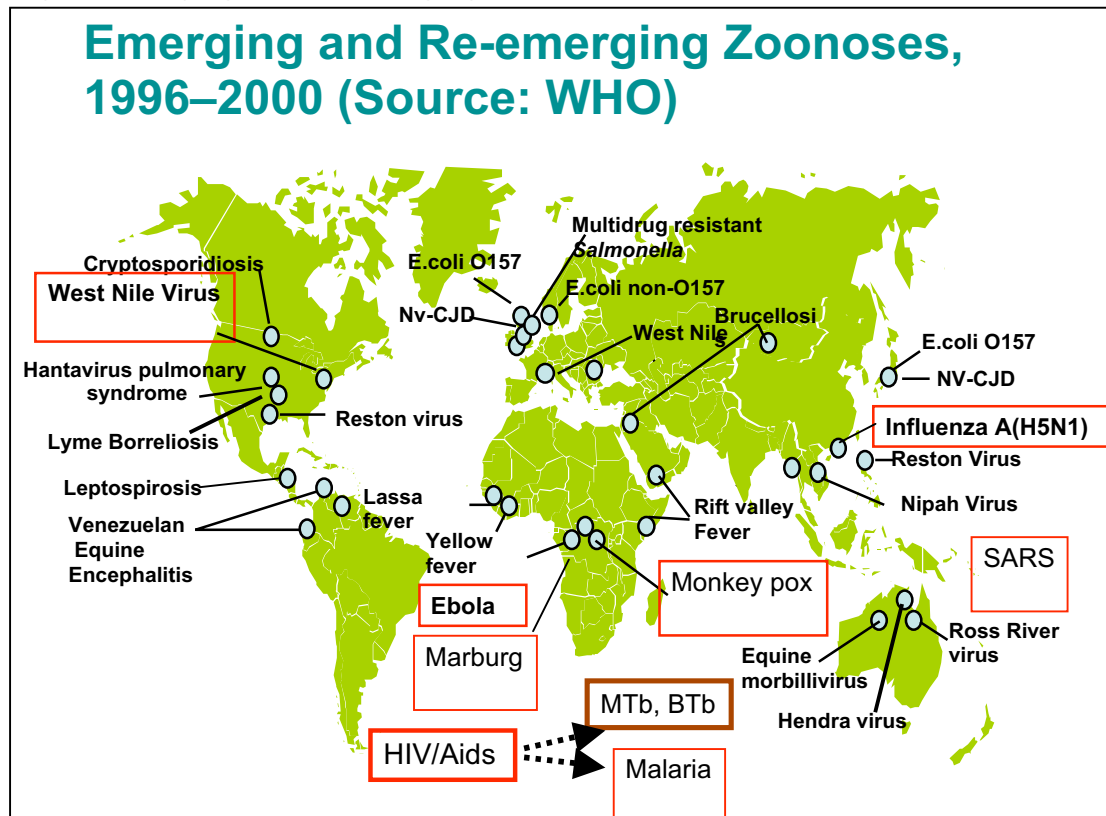
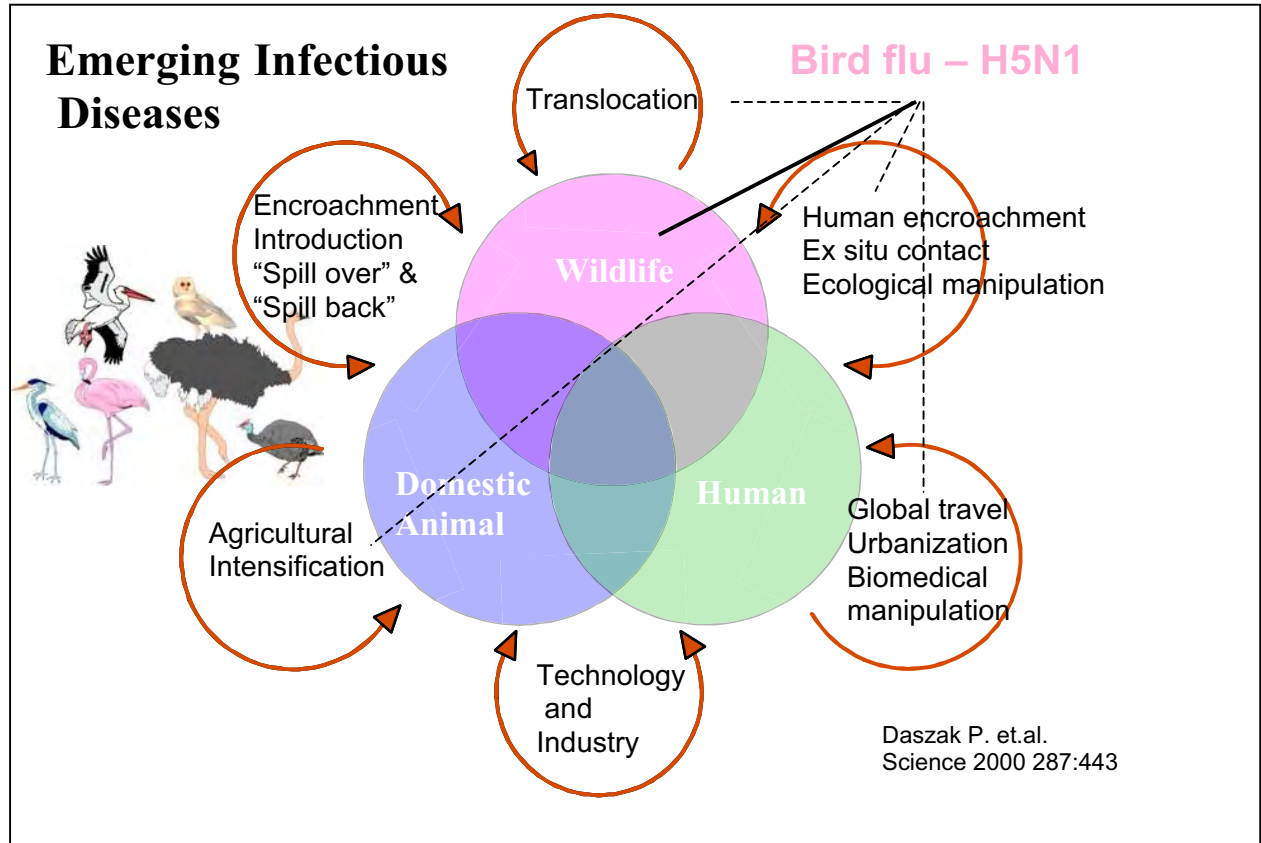
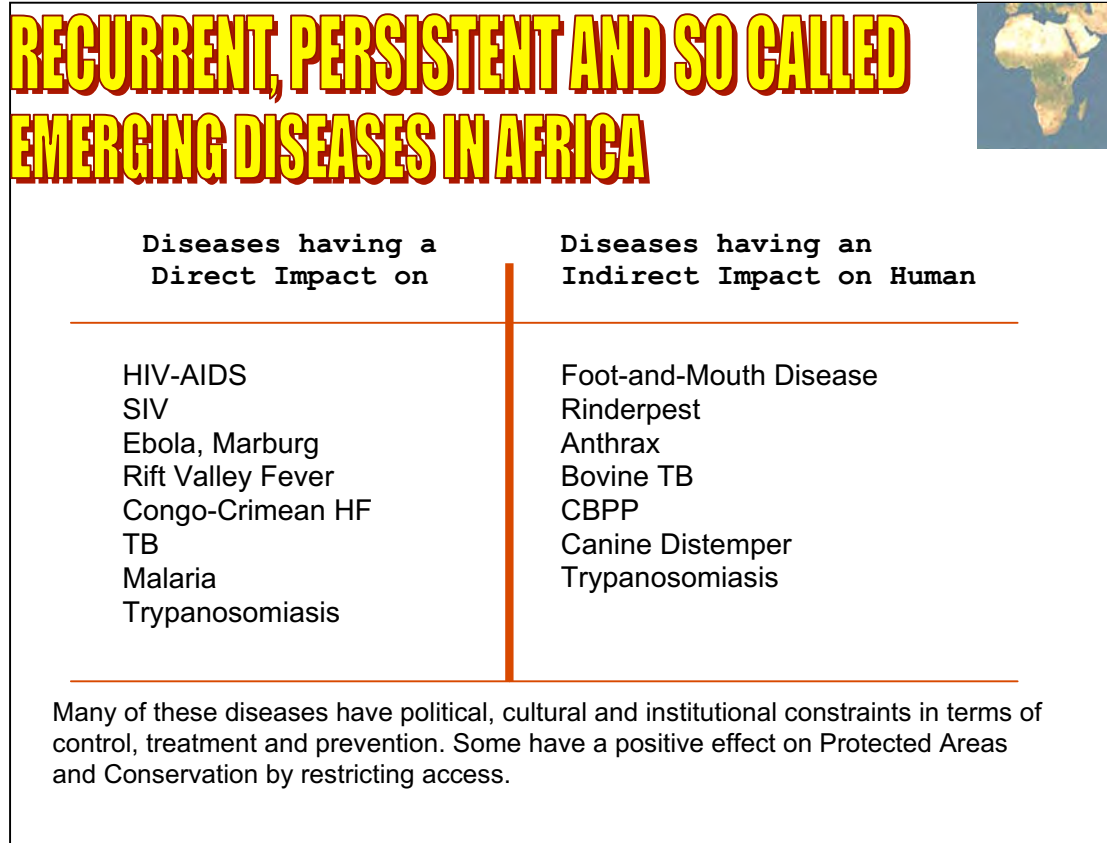


Fig. 2: Emerging infectious diseases:



How infectious diseases and zoonoses affect humans through human encroachment? Effect on livestock farming? Livelihoods?

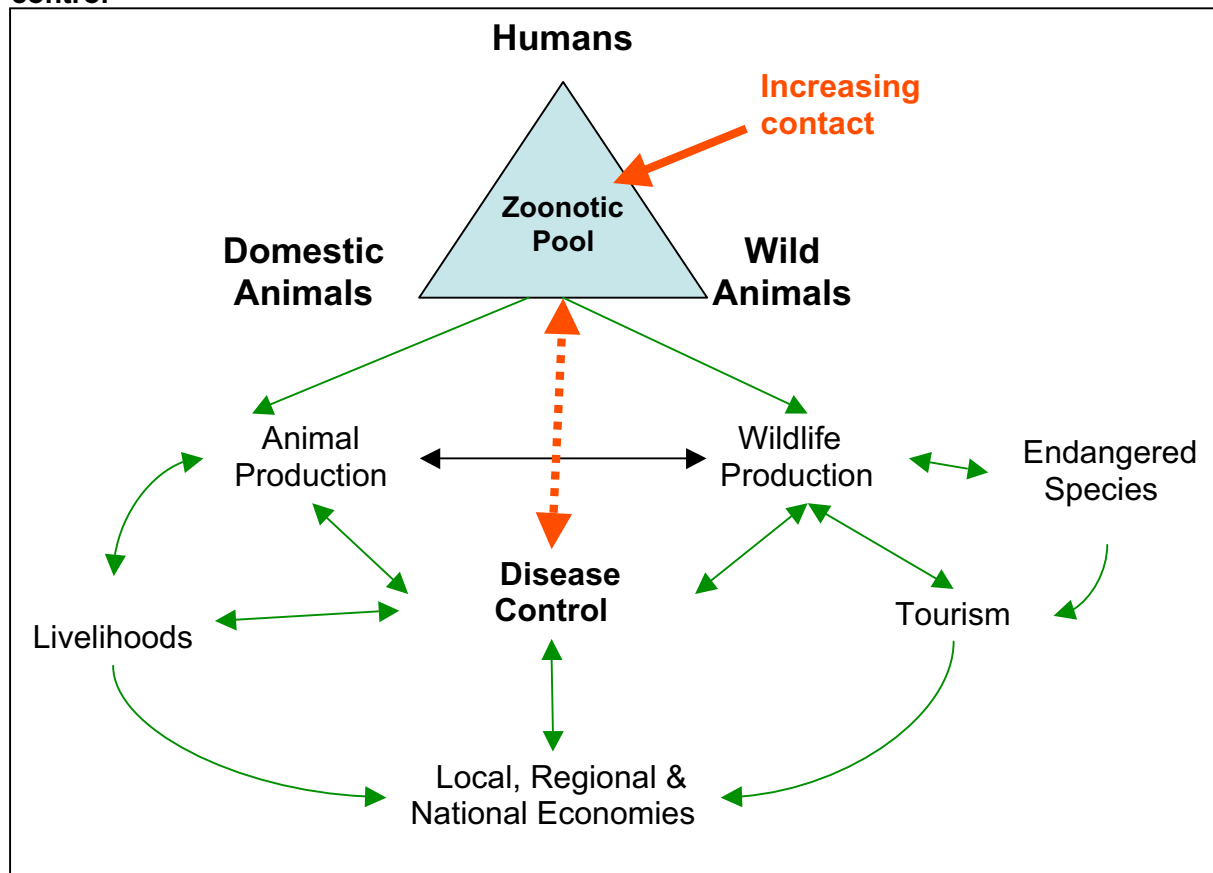
Effect of climate change on vectors, pathogens and zoonoses needs to be investigated.
NB: NEUROLOGICAL diseases emerging.

Fig. 3: Emerging disease in Africa and their direct and indirect effect on human health***Domestic Animal – Wildlife – Human health***

Threats and trends of zoonotic pool to:

- endangered species,
- human health, and
- livestock health

Fig. 4: Triangle depicting integrated method of human, wildlife and livestock disease control



Botswana case study - Foot and Mouth disease control

Baseline:

- Mixed system of land-use that comprises both PA management and livestock farming.
- The implication is that there are veterinary cordon fences and CBPP fences, to keep livestock and wildlife apart.

Disease Control measures:

- Vaccination,
- Test and slaughter,
- Movement controls e.g. fencing to block off migration of carriers and their associated vectors
- Blanket slaughter e.g. CBPP

Wildlife and Ecosystem impacts of measures used:

- More than 2000km fencing erected since 1950's (FMD and CBPP).
- Some scientists claim that the bio-mass has declined 100 fold in the CKGR.
- Others claim that fences are only part of the problem, habitat loss, settlement of people around pans, increase in livestock numbers, and drought, are as important.
- Greatest impact is on Kalahari species that move vast distances for food and water.
- Blue wildebeest and red hartebeest are most affected.

Kruger National Park - Buffalo and TB case study

- More than 2000km fencing erected since 1950's (FMD and CBPP).
- Kruger National Park, situated in South Africa, at the border between Mozambique and Swaziland.

- A TB outbreak in buffalo herds in the southern part of the park has spread to the central and northern parts by 2005.
- At an interface – the high HIV/AIDS rates in populations living around the Park.
- Threats to attempts to open up park to form a TFCA with Namibia and Botswana.

Greater Rungwe, Ruaha NP case study - Pastoralists, livestock, wildlife and TB

Baseline:

- Buffalo herds in the swamps and Ruaha National Park.
- Pastoralists herding livestock through the park, during dry seasons, (300,000 head of cattle).

Human health threats:

- People using the water from rivers for subsistence
- The use of unpasteurized milk from livestock
- High HIV/AIDS infection rate among human population
- Bovine TB and Pulmonary TB
- A shift in paradigm is needed to address these issues in an integrated manner.

Looking AHEAD

There is a need for more research, shift in philosophies and attitudes, new approaches to livelihoods and resource use.

Discussions:

The fencing strategies of Botswana and Namibia were discussed at some length. While the two countries differed it was concluded that there was a need to look at the wider environmental and economic impacts and the trade offs involved in using fences as a disease control strategy.

4. PRESENTATION 3: *Overview of the AHEAD GLTFCA - Sustaining Animal and Ecosystem health in large landscapes – by Dr. David Cumming (AHEAD/WCS consultant)*

SADC has over 20 TFCAs but a lack of research and suitable policies have hampered any integrated strategy to address linkages between animal health and ecosystem health.

A 2-day forum was then held at the Vth IUCN World Parks Congress where there was strong regional representation. The representatives of South Africa, Mozambique, Zimbabwe and Botswana chose the Greater Limpopo Transfrontier Conservation Area (GLTFCA) and Shashe-Limpopo as priority areas.

Effective animal disease control measures based on national borders and fences were in place, until recently.

Current trends:

- TFCA formation,
- Increasing wildlife and cultural based tourism,
- Infrastructure development, and
- Tourism development at grass roots level

However, animal diseases have not been addressed properly in these broad plans.

Other issues of concern are:

- Ecosystem services,
- Animal health and human well being,
- Conflicting policies,
- Inappropriate land uses,
- Water

These lead to land degradation, food insecurity, susceptibility to zoonoses, increased pressure on the environment.

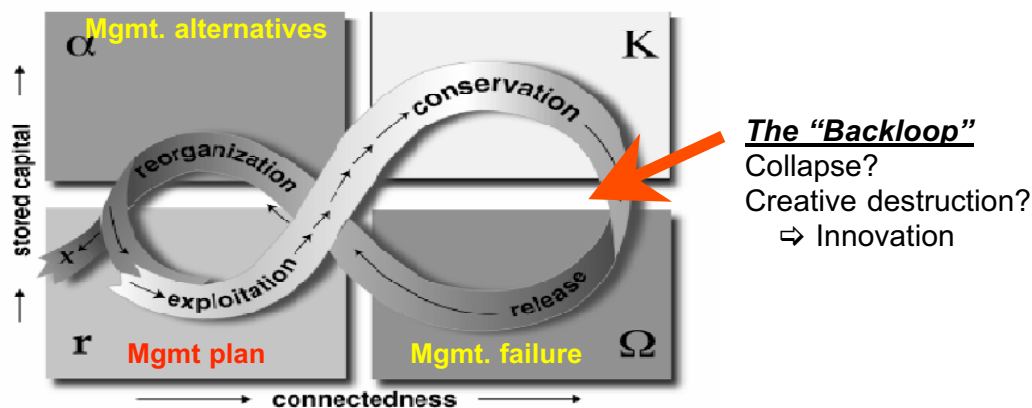
The TFCA concept is understood/perceived as creation of greater landscapes.

Problem or Opportunity?

Has not been tried and international policies were based on optimistic returns from conservation
Animal health interventions on small scales may not work on a larger scale.

Increasing animal health problems?

Outline of the Adaptive Cycle:



Ecological insights:

- Increase scale and diversity
- Scale land uses to savannah process scales
- Match socioeconomic enterprise scales and ecological process scales
- Increase adaptive capacity and resilience of ecological and social systems

Assumptions and Approaches

1. Pilanesburg Resolution
2. Dealing with a TFCA not only the TFNP
3. Management practices need to match scale
4. Scaling up will result in trade offs
5. Command and Control inappropriate
6. Strong participatory approach
7. Healthy mix of scientific approaches
8. Common understanding needed
9. Communication - costly but essential

Scientific Approaches

Healthy mix of approaches to applied science, paradigms and methodologies should be employed and include:

1. Normal science (hypothetico-deductive, reductionist)
2. Integrative science (consilient, inductive, holistic)
3. Post-normal normal science (dealing with uncertainty)

Employ a healthy mix of appropriate scientific approaches, paradigms and methodologies are needed.
Communications and Outreach should also be emphasized.

Overall objectives and themes

To contribute, through innovative and integrated inter-disciplinary research to improving animal and ecosystem health, and human wellbeing in the TFCAs in the GLTFCA (and SADC Region).

Themes:

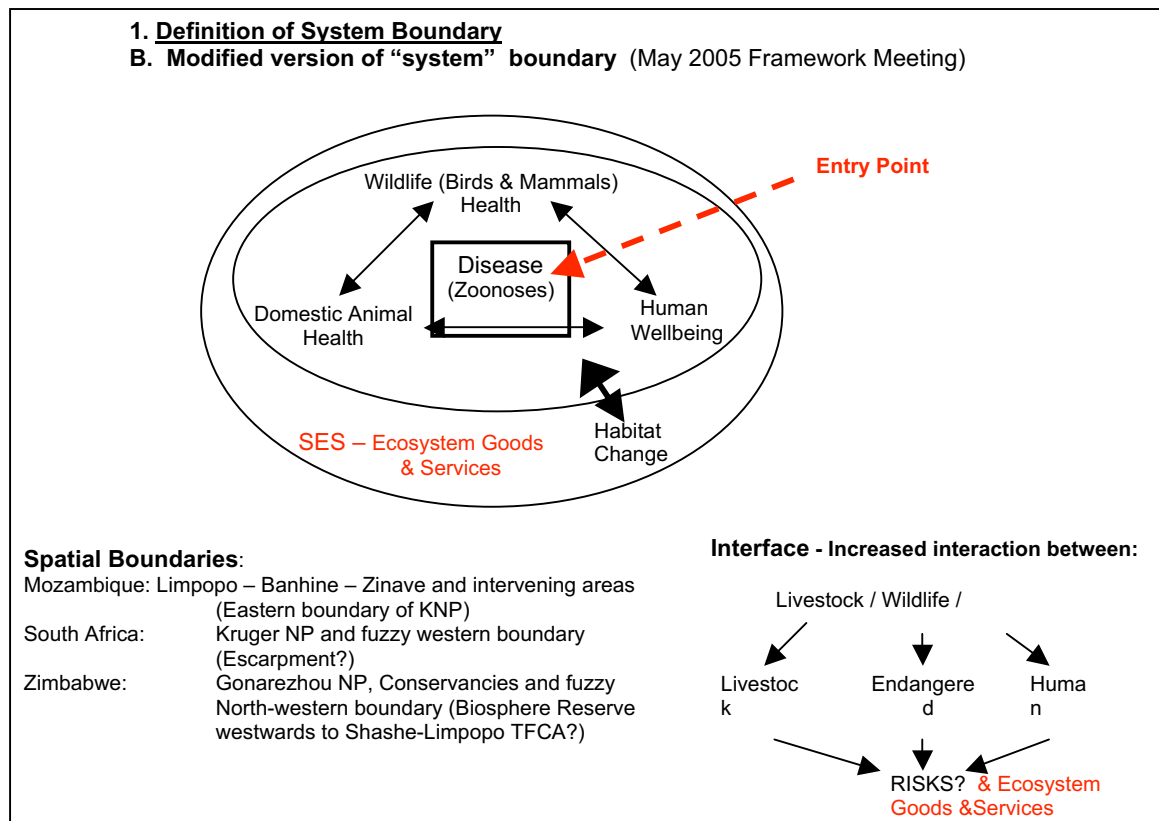
- Overarching frameworks
- Animal health and disease
- Human livelihoods and human health and ecosystem goods and services
- Animal health policy and protocols
- Communications and outreach
- Coordination/integration

Each Theme includes several modules and more specific activities which are elaborated in the Concept document circulated before the Workshop and available on the AHEAD website

Progress:

1. Development of overarching framework. Working Group Meetings, initial project concepts developed, publication of AHEAD Forum papers, functional website.
2. Development of Overarching Conceptual Framework supported (WCS/USAID) and first workshop held in May 05.
3. Scenario planning (module #1 and #4) supported (WCS/USAID & SCF - INR) and full proposal being developed for IDRC by CASS/INR
4. BTb survey in Sengwe Communal Land (PPF and CESVI support)
5. Letters of Understanding – 7 agencies so far
6. Ongoing development of funding proposals

Definition of System Boundaries



5. Discussion of AHEAD concept

Who funds the program?

The core costs of supporting coordination and development of the programme are being provided by WCS with more recent support from USAID. A proposal for major funding was submitted to the Wellcome Foundation in 2004 but was not successful. Approaches have also been made to UNEP GEF but have not yet borne fruit. Peace Parks Foundation supported an assessment of bovine tuberculosis in the Sengwe Communal Lands in the SE Lowveld of Zimbabwe. Other AHEAD projects are currently under development in Zambia, Tanzania and Mongolia

Elephant problems between countries

- Large numbers of elephant population in the corridors between Namibia, Zimbabwe, Botswana and Zambia pose problems for people who cultivate crops. A possible alternative is to use some of these mammals to feed the people.

What are some possible effects of animal disease on Elephant numbers?

- Could be seen as a natural way to reduce and balance out elephant numbers especially in Etosha. However, the cost to the environment should be questioned, for example, burning of elephant carcasses - 7 tonnes of wood used to burn one elephant carcass.

Overwhelming concept, which could be instrumental especially in light of the KAZA initiative! However something should come off it that could be applied nationally. What are the opportunity costs?

- GEF grants are available and after some organization a grant could be applied for. Lessons learned: a large landscape is too ambitious and picking out key issues would ensure a more focused effort intervention.

What is the possibility of integrating this issue into existing programmes such as the north east conservation efforts (Kwandu – Mudumu- Mamili and KAZA)?

- Need to prioritise! Biggest threats to animal health in Namibia are man made and not necessarily natural. Prior list of problems drafted places animal diseases quite low on the list.
- Look at the economic returns from wildlife that are incurred by the country at the moment and then strategise from there. The AHEAD programme may help in identifying high value species and possibly move redline south by one or two farms to establish quarantine camps.
- The meat market in Namibia is blossoming and one cannot compromise it and jeopardise good relations with trading partners (e.g. Cattle farmers).
- There is a need to look at the bigger picture and determine what the best land use is and which approach will benefit the country and its people better. However the suitability of land should also be addressed and the conservancy programme should be looked at in more detail.
- Which system benefits the rural poor more? Which benefits are more targeted towards equity?
- Socioeconomic analysis will be needed to determine that. For example, WWF in Zimbabwe made a thorough financial and economic study of 169 cattle and wildlife ranches in the dryer parts of the country and the results indicated higher returns from wildlife with higher returns on investment in the more arid regions. Diversification is needed especially with climate change and unreliable rains.
- There is also a need for changing peoples' perception – Cattle is mine! Wildlife is ours!

AFTERNOON SESSION

6. Facilitated Discussion: *Can the AHEAD approach enhance prospects for successful conservation and development in Namibia?*

INTERFACE ISSUES	Disease	Social	Economic
Livestock only Livestock + wildlife (south of red line)	-MCF -Rabies -HCF (-parasites not a problem, except in kraals)	-predators -groups of wildlife farms	-wildlife providing rations -economics of alternative land uses i.e. livestock / hunting / tourism -bush encroachment
Conservancies + livestock (north of red line)	-nutritional stress -FMD + vaccination zone -mineral deficiencies	-population pressure -quarantine for	-marketing systems -quarantine requirements – regulations inhibit movement and sale of valuable wildlife across the country (new technology may help) -pricing -poor growth -genetic stocks
KAZA / Caprivi	FMD Corridor Heartwater Tryps Anthrax CBPP	-conflict -overstocking? with improved vet services	-quarantine and marketing - only 2 centres - distances -fencing issues (Botswana) -CBPP

The options for wildlife farms are:

- wildlife/livestock interface,
- new legislation of wildlife,
- reducing fencing,
- kraaling reduces predation but increases parasites.

Ecosystem goods and services:

- bush encroachment under alternative land uses
- wildlife effects
- goats and cattle
- bush blocks as means of controlling encroachment
- fire management

Conclusion: Benefit of trans-disciplinary approach to these problems.

7. Stakeholder Analysis

<i>Stakeholder</i>	<i>Role/mandate Responsibility</i>	<i>Potential Conflict</i>
MET	<ul style="list-style-type: none"> - Oversee and regulate wildlife industry - PA mngt - Import & export of wildlife and wildlife products/CITES, CBD, UNFCCC etc - CBNRM (w/Forestry) - TFCA - Coordination of Research - Key species management - Monitoring and information management 	<ul style="list-style-type: none"> - Issuing of permits (conflict with MAWF) - Wildlife as a land use (MET & MAWF) - Harmonising resource management institutions and regulations (MET, MAWF & Communal conservancies) - GAP veterinary wildlife unit (MAWF)
MAWF	<ul style="list-style-type: none"> - Animal disease control/health Animal - prod. & development - Import & export of livestock product - Regulation of import/export - Diagnostics - Public health (veterinary, water, zoonoses etc.) - Forestry - Provision of bulk water supply - Extension and agric. Engineering services 	<ul style="list-style-type: none"> - Regulations on keeping certain game species (MAWF & Communal conservancies) - Water points development/management in relation to wildlife – elephant (MAWF & MET) - GAP: Streamlining permitting system (MAWF, MET & Ministry of Trade and Industry)
Communal Conservancies		
Freehold Farmers		
Hunting Farms (Freehold)		
MoHSS		
MLR		
Communal Farmers		
Leasehold Farmers		
Farmers Unions		
Traditional Authorities		
Regional Councils		
Conservation NGOs		
Development NGOs		
Meat Board		
FENATA		
Emerging Farmers Association		
NACSO		
NAPHA		
CANAM		

8. Way Forward

A thought on the next steps:

1. Complete the Stakeholder analysis exercise
2. Organise a workshop, involving a bigger group to examine research/development issues in a particular area of Namibia; Caprivi for example. Perhaps commission a team to look at TFCA issues.
3. It is important to look at the benefits of wildlife to communities. Wildlife Resources & community benefits. Wildlife/livestock interface needs to be examined, for example looking at the Caprivi areas.
4. Circulation of workshop proceedings.
5. A look at the population dynamics: livestock/wildlife in freehold/communal areas – productivity, economics and trends (MAWF & MET) – National survey?
6. A look at wildlife distribution.
7. Questionnaire surveys of annual farm visits by vet Dept.

9. Closing by Dr Otto Huebschle

Many thanks to Dr Cumming and Dr Kock for their excellent facilitation. We learned a lot from the presentations given by them. The workshop was good eye opener and very productive. We have learned there are gaps in Namibia in terms of collaboration between various agencies, for helping the population and maximising return from livestock/game/land for people of Namibia. The AHEAD type work could well be taken further in Namibia. Next time, perhaps we can meet in Caprivi.

WORKSHOP PARTICIPANTS

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SOUTHERN AFRICAN DEVELOPMENT COMMUNITY

Regional Biodiversity Strategy



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FOREWORD

Biological resources are a strategic issue in the Southern African Development Community (SADC). They account for a significant proportion of the region's Gross Domestic Product and are a source of livelihood for the bulk of its citizens. This explains why the maintenance, enhancement or restoration of biodiversity is viewed as a means for achieving the region's socio-economic development and not as an end in itself.

We are mindful that part of our rich natural heritage has global significance for the world's climate and for agricultural and industrial development. In addition, 26 of the 82 sites globally chosen for their species richness and endemism in sub Saharan Africa are in southern Africa and more than 40% of the region's species are endemic. We however note, with concern, that despite the existence of this biological wealth, the region remains poor largely due to its inability to transform its natural resource capital into value added goods and services.

Throughout centuries, the people of southern Africa have developed strategies for tending and caring for their biological resources for the benefit of their own and future generations. Unfortunately, the capacity of nature to provide for us is rapidly diminishing due to population pressures and changes in the socio-economic environment, including urbanization. We however realize that the successful conservation and sustainable use of the region's biological resources depends on trans-boundary cooperation. It is therefore gratifying to note that there is sufficient political will for trans-boundary cooperation within SADC as enshrined in its vision of "A common future for all countries and peoples of southern Africa" and its desire to confront underdevelopment and marginalization by jointly addressing mutual aspirations and problems.

This Regional Biodiversity Strategy provides a framework for cooperation on biodiversity issues that transcend national boundaries. It is premised on the fact that the state of the environment, including biodiversity, is a major determinant of the growth and development of the region and impacts on the lives of its citizens. It is against this background that the Regional Biodiversity Strategy should be viewed as a vehicle for implementing the biodiversity components of our Regional Indicative Strategic Development Plan. The latter embodies the ideals of the New Partnership for Africa's Development and the Millennium Development Goals.

More specifically, the Regional Biodiversity Strategy highlights priority actions required to unleash the wealth locked up in the region's biological resources through value addition and "biotrade", on a sustained basis. It also articulates ways to ensure that the peoples of southern Africa and the world at large mutually benefit from the region's biological heritage through appropriate access and benefit sharing arrangements.

In advancing this Regional Biodiversity Strategy we remain mindful that natural resources alone are not a panacea to southern Africa's development problems. Consequently, it will only complement other development strategies being pursued by the region. We also recognize the need to aggressively market the Regional Biodiversity Strategy and to bring on board all relevant stakeholders, including our development partners, for its successful implementation.

Festus Mogae

President of the Republic of Botswana and Chairperson of the Southern African Development Community.

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The Regional Biodiversity Strategy was developed through a participatory process that involved extensive stakeholder consultations within SADC Member States. Government agencies, the private sector, non-governmental organizations, academic institutions and international cooperating partners participated in the consultations through various mechanisms, including national and regional workshops. Inputs from these fora greatly enriched the document.

Dr Enos Shumba, Dr George Phiri and Mr Robert Ondhowe of the SADC BSP Management Unit compiled the Regional Biodiversity Strategy. The process was ably guided by Mr. Nik Sekhran, Mr Leonard Dikobe, Mr Steve Nanthambwe, Dr James Murombedzi and Mrs Tabeth Chiuta of the Programme's Coordination Committee and Mrs Dollina Malepa, Mr Steve Zuke and Mrs Anselmina Liphola of a Task Force constituted by the Programme's Regional Steering Committee. The document greatly benefited from independent inputs made by Dr Luis Navarro, Dr Yemi Katerere, Mr Jonathan Timberlake, Dr Phoebe Barnard, Mr Frank Kufakwanda, Dr Harrison Kojwang, Dr Allan Rogers and Dr Steve Osofsky.

ACRONYMS

ABS	Access and Benefit Sharing
ADB	African Development Bank
AHEAD	Animal Health for the Environment And Development
BSP	Biodiversity Support Programme
CIFOR	International Centre for Forestry Research
CHM	Clearing House Mechanism
CBNRM	Community Based Natural Resource Management
CITES	International Convention on Trade in Endangered Species
CBD	Convention on Biological Diversity
CSIR	Council for Scientific and Industrial Research
EIA	Environmental Impact Assessment
FANR	Food, Agriculture and Natural Resources
FAO	Food and Agricultural Organization
GMOs	Genetically Modified Organisms
GEF	Global Environment Facility
GDP	Gross Domestic Product
HIV/AIDS	Human Immune-Deficiency Virus/Acquired Immune Deficiency Syndrome
IAS	Invasive Alien Species
ICRAF	World Agroforestry Centre
IUCN	World Conservation Union
MDGs	Millennium Development Goals
NBSAP	National Biodiversity Strategy and Action Plan
NEPAD	New Partnership for Africa's Development
NGOs	Non Governmental Organizations
NTFPs	Non Timber Forest Products
RISDP	Regional Indicative Strategic Development Plan
R&D	Research and Development
SADC	Southern African Development Community
SARDC	Southern African Research and Documentation Centre
SNC	SADC National Committee
TBNRM	Trans-boundary Natural Resources Management
TFCAs	Trans-frontier Conservation Areas
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WCS	Wildlife Conservation Society
WIMSA	Working Group of Indigenous Minorities in Southern Africa
WWF	World Wide Fund for the Conservation of Nature

EXECUTIVE SUMMARY

The Southern Africa Development Community (SADC) is rich in biological resources, some of which have global significance. Most biodiversity issues and values in the region transcend national boundaries. The values are building blocks for a variety of ecosystem services; the most important of which are water, maintenance of soil fertility and absorption of pollutants. In addition, several species of mammals, birds, butterflies and fish exhibit trans-boundary migration patterns. Over half of the Gross Domestic Product of SADC Member States comes from primary sectors of production that are based on biodiversity in its broadest sense. Furthermore, most of their citizens live in rural areas where they depend on natural resources for survival. This underpins the importance of biological resources in southern Africa. The region is characterized by high levels of poverty that emanate from its inability to effectively transform its biological resource capital into goods and services for socio-economic development. It is also facing serious environmental challenges that are leading to the loss of its rich biological heritage and ecological processes.

Biodiversity is a basic resource for sustainable development in southern Africa. It is also central in the region's drive to meet the Millennium Development Goals (MDGs) to which its Member States aspire. All Member States have signed the Convention on Biological Diversity (CBD) that calls on them to "conserve biodiversity, use it sustainably, and equitably share benefits therefrom. To meet these objectives, Member States were asked (via Article 6A of the Convention) to produce National Biodiversity Strategy and Action Plans (NBSAPs). The Plans have or are in the process of being completed.

The objectives of this Regional Biodiversity Strategy are to:

- Provide guidelines that build the region's capacity to implement provisions of the CBD;
- Provide a framework for obtaining regional consensus on key biodiversity issues;
- Act as a vehicle for forming partnerships with development partners on trans-boundary biodiversity issues; and,
- Provide a framework for cooperation between Member States and with relevant multilateral environmental agreements.

The Regional Biodiversity Strategy is built around values of biodiversity and constraints to biodiversity conservation and its sustainable use in the region. These were formulated from country level constraints articulated in national planning frameworks such as NBSAPs. A wide range of stakeholders participated in the Regional Strategy development process.

The following regional constraints were given highest priority:

- Limited alternative livelihood opportunities outside agriculture and natural resource exploitation, thereby increasing pressure on natural resources;
- Inadequate biodiversity inventory and monitoring systems, and knowledge on and ability to handle biodiversity information;
- Inadequate incentives for biodiversity conservation and its sustainable use;
- Low levels of awareness, knowledge and appreciation of biodiversity at various levels;
- Weak institutional and legal frameworks for implementing biodiversity initiatives;

- Limited and unsustainable funding for the implementation of Biodiversity Work Plans from the CBD;
- Inadequate research and development approaches for implementing biodiversity programmes; and,
- Limited attention to the management of Genetically Modified Organisms and Invasive Alien Species, both of which are major issues in southern Africa.

The Regional Biodiversity Strategy is presented in the form of a matrix that highlights strategies to address the priority regional constraints and focal areas (sets of activities) for specific project development. Its scope is threefold:

- Enhancing the region's economic and business base by adding value to its biological resources and engaging in "Biotrade";
- Ensuring that economic opportunities from "Biotrade" and related initiatives do not lead to the unsustainable use of the region's biodiversity; and,
- Developing and promoting regional programmes on: biodiversity awareness; capacity building; research and development; and sustainable financing.

Fifty focal areas that address the eight regional constraints were identified. They cut across the traditional biodiversity sectors of forestry, wildlife, aquatic life and agriculture and focus on species and habits of economic importance. In addition, they address the poverty-environment-governance challenges articulated in the Regional Indicative Strategic Development Plan, the New Partnership for Africa's Development and the MDGs.

The operationalization of focal areas of the Regional Biodiversity Strategy will depend on the availability of both internal and external funding. The interests of the funding sources will therefore influence their sequencing. The following activities will be carried out on the Regional Biodiversity Strategy:

- SADC will extensively and continuously market the Regional Strategy and its activities to various stakeholders and partners;
- The SADC Secretariat will encourage Member States and development partners to develop and implement projects within their preferred focal areas;
- The SADC Secretariat and partners will develop concept notes and detailed project proposals within the focal areas. These will be submitted to interested development partners as they come on stream; and,
- SADC will review the Regional Biodiversity Strategy every five years.

REGIONAL BIODIVERSITY STRATEGY

1.0 Introduction

1.1 Vision, goal and objectives

The vision of the Regional Biodiversity Strategy is to conserve biodiversity across the Southern African Development Community (SADC) and to sustain the region's economic and social development in harmony with the spiritual and cultural values of its people. Its goal is to promote equitable and regulated access to, sharing of benefits from, and responsibilities for protecting biodiversity in the SADC region.

The purpose of the Regional Biodiversity Strategy is to provide a framework for regional cooperation in biodiversity issues that transcend national boundaries and to stimulate the combined and synergistic efforts by SADC Member States and their communities in biodiversity conservation and its sustainable use. It contributes to the achievement of SADC's goals of social and economic development and poverty eradication as embedded in the Regional Indicative Strategic Development Plan (RISDP); the New Partnership for Africa's Development (NEPAD) Environmental Action Plan; and the Millennium Development Goals (MDGs). Its specific objectives are to:

- Provide guidelines that build SADC's capacity to implement provisions of the Convention on Biological Diversity (CBD) and to address biodiversity challenges more effectively;
- Provide a framework for obtaining regional consensus on key biodiversity issues and enable SADC to articulate unified positions at international fora such as the Conference of Parties to the CBD;
- Act as a vehicle for forging partnerships with various development partners and the international community on biodiversity issues; and,
- Provide a framework for cooperating with relevant international instruments such as the United Nations Convention to Combat Desertification (UNCCD), the United Nations Framework Convention on Climate Change (UNFCCC), the Law of the Sea, the Convention on Migratory Species, the Convention on International Trade in Endangered Species (CITES) and the Ramsar Convention on Wetlands.

Box 1 provides a definition of biodiversity. The Regional Strategy focuses on promoting a decentralized access and management of biodiversity in order to enhance its protection and sustain its contribution to social and economic development with emphasis on poverty eradication. It recognizes that biodiversity is a source of wealth and development that is renewable but fragile and needs care to sustain its contribution to wealth and development. The Regional Strategy acknowledges that because of its dispersed nature and exposure to human populations, the protection and sustainable use of biodiversity needs to be decentralized and equitable for it to be effective. "Equitable" refers to "fair and optimal" as opposed to the utopian "equality" (Navarro, personal com).

Box 1: What is biodiversity?

Biodiversity is the variation between ecosystems and habitats; the variation between different species; and the genetic variation within individual species. It is a system of interactions between genes, species, and the ecosystems they form, influencing and influenced by ecological and evolutionary processes. The processes help to sustain biological systems and to ensure their productivity. Biodiversity forms the foundation of the vast array of eco-system products and services that contribute to human well-being and drives the economies of SADC Member States.

1.2 Regional overview

SADC consists of thirteen Member States located in the southern part of the African continent. They are Angola, Botswana, the Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. The region is rich in biological resources, some of which have global significance. Most biodiversity issues in SADC transcend national boundaries and several species of mammals, birds, butterflies and fish exhibit trans-boundary migration patterns. The Regional Biodiversity Strategy covers all the thirteen SADC Member States who are also signatories to the CBD. However, it does not assume the individual country responsibilities under the Convention.

Over 50% of the Gross Domestic Product (GDP) of SADC Member States comes from primary sectors of production such as agriculture, mining, forestry and wildlife. Furthermore, between 40% and 85% of their citizens live in rural areas where they depend on natural resources for survival. This scenario underlines the overriding importance of biological resources in southern Africa. Although the region is endowed with natural resources, it is characterized by high levels of poverty that emanate from its inability to effectively transform this biological capital into goods and services for social and economic development and poverty eradication. Furthermore, SADC is facing serious environmental challenges/threats largely originating from increasing human population relative to resource availability; agricultural expansion coupled with declining land productivity; continued reliance on wood fuel; increasing land degradation; and climate change. Box 2 highlights the threat caused to biodiversity by climate change. Even more dominant is the continuing erosion of human capacity due to HIV/AIDS and the resultant inability of Member States to adequately address the foregoing challenges. These factors are resulting in the loss of biological resources and ecological processes.

However, the Regional Biodiversity Strategy recognizes that the restoration, maintenance or enhancement of biodiversity is not an end in itself, but a means to achieving the region's socio-economic development goals. Consequently, it focuses on species and habitats of economic importance.



The Regional Biodiversity Strategy focuses on species and habitats of economic importance

Box 2: Climate change as a threat to biodiversity

Climate change refers to a change in climate attributed directly or indirectly to human activity that alters the composition of the global atmosphere. This is additional to natural climate variability observed over comparative time periods. Climate change alters the spatial and temporal patterns of temperature and precipitation, the fundamental factors that determine the distribution and productivity of vegetation. Among the potential impacts of carbon dioxide induced climate change in the region are:

- Drying of woodlands and savannas of the semi-arid and sub-humid areas;
- Altering the frequency, intensity, seasonality and extent of vegetation fires. Such fires are critical for maintaining areas such as miombo woodlands and the fynbos of the Cape;
- Reducing the yields of certain cereal crops such as maize, sorghum and rice; and,
- Negatively impacting on freshwater and marine ecosystems.

It is, however, worth noting that southern Africa's vast forest resources, especially the miombo and similar woodlands, are significant sinks for carbon dioxide and thus have a potential role in alleviating and balancing emissions from industrialized countries through carbon sequestration. This underscores the need to maintain as much forest cover as possible, recognizing other economic activities that compete with forestry. Furthermore, it provides opportunities for the region to benefit from the Clean Development Mechanism under the Kyoto Protocol.



Southern Africa's vast forest resources, especially the miombo and similar woodlands, are significant sinks for carbon dioxide and thus have a potential role in alleviating and balancing emissions from Industrialized countries .

1.3 Methodology used

The realization of the Regional Biodiversity Strategy's objectives requires a thorough analysis of available instruments and their status in relation to biodiversity conservation and its sustainable use in the region. The instruments, commonly referred to as drivers of socio-economic development, fall into three categories namely; political, institutional and technological. A constraint analysis was used to

assess the status of these instruments and to articulate a problem statement for the Regional Strategy using a bottom up approach. The analysis was based on national constraints contained in National Biodiversity Strategy and Action Plans (NBSAPs) and other national level planning frameworks (e.g. Poverty Reduction Strategy Papers, National Conservation Strategies, National Environment Action Plans and State of the Environment Reports) to arrive at regional constraints. Criteria used to prioritize the constraints included their trans-boundary nature (in terms of the number of countries affected) and the ability of opportunities that emanate from them to contribute to SADC's goals of social and economic development and poverty eradication. The constraints were continuously reviewed in line with stakeholder and specialist inputs and emerging opportunities at various levels.

The rationale for adopting a constraint-based approach in developing a problem statement for the Regional Strategy was that constraints (encompassing policy, institutional and technical considerations) determine what people can do, want to do and end up doing. For example, they determine the biodiversity and complementary resources that SADC citizens can, individually or collectively, access and use for their livelihood and development; their knowledge and skills to use such resources; and their motivations. Motivations determine the benefits and ways in which citizens utilize the knowledge skills and resources they have or can access (Navarro, personal com).

The development of the Regional Strategy involved a wide range of stakeholders through various processes that included the following:

- Regional consultative workshops held in Swaziland and Zambia in June 2002 and November 2002 respectively;
- A meeting of the Task Force of the SADC Biodiversity Support Programme's Regional Steering Committee held in Swaziland in February 2005;
- An External Peer Review of the draft Strategy carried out between February and April 2005. Some 16 technical, policy and institutional experts from government; local, regional and international non-governmental organizations (NGOs); universities; the private sector and donor agencies reviewed the document;
- Country level consultations on the document were carried out between April and May 2005; and,
- A regional workshop to discuss and finalize the document was held in South Africa in June 2005. Two biodiversity experts from each Member State (one government and one NGO representative) and representatives of regional and international organizations attended the workshop.

1.4 Outline of document

This document first presents the problem statement in the form of regional constraints to biodiversity conservation and its sustainable use in southern Africa. The scope of the Regional Strategy and focal areas (sets of activities) for detailed project proposal development under each constraint are then given. The Regional Strategy's implementation framework is presented in the last section.

An introduction to the Regional Biodiversity Strategy is given in Annex I while Annex II highlights the status of biodiversity in southern Africa. Constraints to biodiversity conservation in individual Member States are presented in Annex III.

2.0 Problem statement

2.1 Preamble

A regional consultative workshop convened in Swaziland in June 2002 identified and prioritized a number of regional constraints to biodiversity conservation and its sustainable use in southern Africa. It initially identified 26 constraints. These were reduced and consolidated to a set of eight that were felt to be manageable within the context of the Regional Biodiversity Strategy. They are presented in Table 1 and constitute the problem statement for the Regional Strategy.

Table 1: Regional constraints to biodiversity conservation and its sustainable use; and strategies to address them.

Regional constraint	Strategy
1. Increased pressure and demand on biodiversity and agricultural land due to limited alternative livelihood opportunities outside agriculture and natural resource exploitation.	1. Facilitate the development and implementation of affordable, viable and acceptable alternatives for economic development and human survival.
2. Inadequate biodiversity inventory and monitoring systems, and knowledge on and ability to handle biodiversity information.	2. Develop and implement comprehensive but simple biodiversity inventory and monitoring projects covering key species of flora, fauna and habitats; and skills to handle and package the information, leading to improved knowledge and better management of biodiversity.
3. Inadequate incentives for biodiversity conservation and its sustainable use.	3. Enhance the economic value of biological resources and develop mechanisms to equitably share the resultant benefits.
4. Low levels of awareness, knowledge and appreciation of biological resources at various levels.	4. Enhance awareness, information and knowledge on biological resources at various stakeholder levels.
5. Weak institutional and legal frameworks for carrying out biodiversity initiatives.	5. Strengthen institutional and legal frameworks for implementing biodiversity initiatives.

6. Limited and unsustainable funding for implementing biodiversity programmes.	6. Provide a sustainable and readily accessible financial base to support biodiversity programmes.
7. Inadequate research and development approaches for biodiversity initiatives.	7. Develop appropriate research and development approaches for biodiversity initiatives.
8. Limited attention to the management of Genetically Modified Organisms (GMOs) and Invasive Alien Species (IAS).	8. Improve the region's capacity to manage GMOs and IAS.

2.2 Constraints

This section summaries the eight constraints to biodiversity conservation and its sustainable use in the region.

2.2.1 Increased pressure and demand on biodiversity and agricultural land due to limited alternative livelihood opportunities outside agriculture and natural resource exploitation.

The economies of most SADC Member States are based on agriculture and the majority of the inhabitants practice subsistence farming. Consequently, forestry and wildlife habitats continue to give way to agricultural expansion to meet the food requirements of the growing population. Furthermore, there is limited value addition to agricultural and natural resources products that comprise the backbone of the region's economies.

With respect to energy sources, fuel wood and charcoal provide more than 50% of the region's energy requirements. This is largely because alternative energy sources such as electricity and kerosene are very expensive and/or not readily available. The net effect of this has been excessive tree cutting to meet the energy needs of rural and urban dwellers.

Unfortunately, very little effort has been put into broadening the existing energy sources or increasing their productivity. For example, although forest management plans have been developed for a number of indigenous forests in the region, most of them have not been implemented. One of the reasons for this is that existing technologies on indigenous forest management are inappropriate as they only focus on commercial timber production and not on the production of multiple products and services that are needed by local people.

It is also worth noting that at the community level, natural resources continue to be the last line of defence in the face of calamities such as droughts that have become a common feature in southern Africa.



At community level, natural resources are the last line of defense for survival.

2.2.2 Inadequate biodiversity inventory and monitoring systems, and knowledge on and ability to handle biodiversity information.

There have been limited national and regional level inventories of various biodiversity components as illustrated by the following:

- Only the large and commercial species of wildlife have been regularly inventoried and monitored because of their importance in national economies. Similarly, regular inventory and monitoring programmes are usually in place for commercial indigenous timber species and exotic timber plantations. Other species that provide a range of timber and non-timber forest products to local communities have not been catered for. This is also true of agro-biodiversity and aquatic biodiversity where inventories and monitoring systems are only in place for species of economic importance such as cash crops and fish respectively.
- The monitoring of biodiversity habitats, some of which are under extreme pressure (Box 3), is often lacking. However, such information is critical for the effective management of cross-border initiatives such as Trans-boundary Natural Resource Management (TBNRM) programmes and internationally shared water resources. Box 3 depicts the pressure being exerted on some coastal habitats.

Other constraints associated with the existing biodiversity inventory and monitoring systems in the region include the following:

- The inventory and monitoring methods tend to vary between countries. This makes it difficult to compare results, especially on trans-boundary initiatives. Furthermore, the technical and institutional capacity to conduct inventories and monitoring studies varies across the region. The capacity to analyse and utilize the available knowledge is also limited.
- The existing inventory and monitoring systems do not take into account the values and aspirations of local people on the basis of their indigenous knowledge. Such knowledge has, and continues to play an important role in areas such as food security; agricultural development; and human, animal and plant health. Its incorporation into biodiversity inventory and monitoring systems is therefore critical given that local communities have lived with and managed biological resources for centuries.
- There have been no incentives to inventory and monitor biodiversity except in a few habitats such as protected areas and for species of economic importance.



Veld products provide a range of timber and non-timber forest products (e.g. fuel wood) to local communities. However, they are not catered for in most inventory and monitoring programmes

Box 3: Some coastal habitats are under extreme pressure.

Coastal erosion is a growing problem that is exacerbated by the upstream construction of dams, the development of coastal infrastructure such as artificial lagoons and the clearing of mangroves. On the east coast of southern Africa, coral reefs and sea grass beds are being silted by excessive upstream erosion and sediment discharge. Once settled, the sediments clog the delicate filter feeding apparatus of corals and other reef feeding organisms. In addition, the mining of sand, corals, limestone and shells depletes the buffer zone provided by coral reefs and exposes shores to wave action, storm surges and inundation. Coastal erosion is primarily caused by uncoordinated and inappropriate developments in the coastal zone, high population growth and the rapid development of the tourism industry. The need for Environmental Impact Assessments (EIAs) before such developments are embarked upon cannot be over emphasized. In addition, mitigatory measures recommended in EIA reports should be implemented timeously.

The lack of up to date information on biodiversity makes it difficult to effectively plan, manage and monitor biodiversity conservation and its sustainable use in the region. It also makes it difficult to demonstrate the value and impact of biodiversity losses to national and regional economies; to ecosystems; and to local communities.

2.2.3 Inadequate incentives for biodiversity conservation and its sustainable use.

There have been very limited incentives for biodiversity conservation and its sustainable use at both local and national levels in southern Africa. Reasons for this include communal land tenure systems; restrictive policies and legislation; and the low economic value of most biological resources. These issues are elaborated below.

a) Communal land tenure systems.

A significant proportion of land in the region is communally owned. Communities usually manage such land through communal user rights arrangements that give them open access to biological resources on the land. It has been argued that this tenure system is a disincentive to investment in agriculture and other key natural resources. Consequently, the highest rates of deforestation, wildlife decimation and land degradation in the region are taking place on communally owned land. However, some governance changes are now taking place to address this problem. For example, local bodies and communities are being empowered to manage and benefit from communal resources through a process of decentralization and devolution of administrative powers and responsibilities. Customary ownership of land is also receiving legal recognition in some Member States. For example, Mozambique's land reform law of 1997 recognizes customary land rights over local resources. Similarly, Namibia's 1998 land policy acknowledges the rights of local communities to woodland resources. On the other hand, Zimbabwe's land reform programme aims to transfer some land to the bulk of the country's citizens and decongest the currently over populated communal areas in the process. The impact of these policy changes on the sustainable management of biological resources in these countries still remains to be seen.

(b) Restrictive policies and legislation.

Most of the existing legislation in southern Africa precludes neighbouring communities from accessing goods and services from protected areas that account for about 15% of the region's total land area. Because of the restrictive legislation, protected areas have remained "islands of green" surrounded by degraded communally owned landscapes, and have the following attributes:

- Their rich forest and wildlife biodiversity has facilitated the development of a booming tourism industry;
- They provide habitats for endangered species of flora and fauna. For example, the bulk of "important bird areas" for threatened or endangered bird species such as the crowned crane and bearded vulture are found in protected areas; and,
- They offer opportunities for TBNRM initiatives as 70% of them lie across international boundaries.



*Protected areas provide refuge/
habitat for endangered species
of flora and fauna, e.g. Important Bird
Areas (IBA) for the crowned crane.*

Some of the region's protected areas are under siege from neighbouring communities who have resorted to poaching and establishing illegal settlements on them. Community participation and the development of appropriate mechanisms for benefit sharing are therefore critical for the sustainable management of these areas (Box 4). The Communal Areas Management Programme for Indigenous Resources in Zimbabwe presents a major participatory approach for communities that neighbour national parks areas. However, the approach has yet to find wide application for other natural resources such as commercial timber and veld products (Machena *et al*, 2005). Similar initiatives in other parts of SADC face challenges of inadequate benefit sharing arrangements and thus fail to address the household dilemma of how natural resources can benefit people and reduce poverty. For example, huge sums of money have been realized at the levels of District Councils, Community Trust Committees and similar structures with little conversion to household incomes. Should this pattern continue, the concept of community participation might lose popularity and political support (Dikobe, personal com.).

Box 4: Biodiversity for people (Visser *et al*, 2005)

Despite their weak political and economic clout, most communities remain key actors in the management of natural resources. They are the direct resource dwellers and users and are vital in influencing conservation outcomes. Conservation strategies therefore need to broaden their focus from strict policing of protected areas to the inclusion of local people in conservation management.

c) Low economic value of biological resources

Most biological resources have low economic value in their natural state and local communities derive little benefit from them (Box 5). Consequently, some Community Based Natural Resource Management (CBNRM) initiatives focusing on resources such as veld products have had limited success. This is largely because communities see little benefit in their continued participation in such projects due to their relatively low returns. Notwithstanding, it is interesting to note that experiences with CBNRM in southern Africa have greatly influenced global thinking on issues of sustainable use, especially in the case of the elephant. There is also growing interest in adding value and commercializing biological resources in the region. For example, the Southern African Natural Products Association (Phyto Trade Africa) is developing commercial opportunities from natural products (products derived from indigenous plants) for the benefit of rural communities in the SADC region. It does this through investment in Research and Development (R&D) and market development, whilst facilitating linkages between rural producers and private sector processors and manufacturers. Through the creative use of public funds, Phyto Trade Africa has been able to leverage significant private sector investment in R&D. However, it remains one of the very few cases in which favourable conditions for private sector investment have been successfully created (Le Bretton, personal com.). Given the foregoing, there is need to build incentives into technologies, policies and institutional support programmes that deal with biodiversity issues in southern Africa.



It is interesting to note that experiences with CBNRM in Southern Africa have greatly influenced Global thinking on issues of sustainable use, especially in the case of the Elephant.

Box 5: Inadequate incentives for sustainable natural resource management

Most Non-Timber Forest Products (NTFPs) and other natural resources are consumed or sold in their raw or semi processed forms at source. Consequently, the bulk of the resultant benefits from such resources accrue to outsiders such as middlemen and developed countries who add value to them through further processing and packaging. In addition, indigenous knowledge on these biological resources is not protected against biopiracy. This is partly because the global Intellectual Property Rights system does not recognize traditional knowledge, as it has not been properly documented. There is therefore need for a *sui generis* legislation that recognizes traditional knowledge and appropriately rewards its holders when it is exploited for commercial gain by outside parties.

2.2.4 Low levels of awareness, knowledge and appreciation of biological resources at various levels

In southern Africa, biological resources are largely considered as a medium for development and not a source of development. Consequently, very limited information and knowledge exists on them in terms of their value, status and potential. In situations where such information is available, it has not been properly packaged and disseminated to relevant stakeholders. As a result, natural resources are taken for granted and expected to avail themselves for exploitation whenever the need arises. This has led to the following:

- The wanton destruction of various biological resources for immediate gain without due consideration to future needs and impacts on the environment. For example, the commercial exploitation of plants for medicinal purposes and crafts has become an important component of forest conversion and is threatening a number of plant species (Box 6);
- Insufficient appreciation of the importance of biodiversity to national economies and sustainable livelihoods. This is partly reflected in the lower national budget allocations to

natural resource conservation and management. Furthermore, biodiversity has not been adequately and effectively mainstreamed into other sectors of national economies; and,

- Limited investment in areas such as value addition and bio-prospecting by national governments. This partly reflects the limited appreciation of what biological resources contribute to local and national economies.

Given the foregoing, the need for proper policy definition and guidance and motivation of stakeholders regarding benefits and ways to conserve and sustainably use biodiversity in the region cannot be over-emphasized.

Box 6: Loss of plant species

At the plant species level, there has been a marked decrease in the abundance of certain plants due to various human induced pressures. For example, the over-reliance on traditional medicinal plants for primary health care by the majority of the region's citizens has contributed to the over-exploitation of species such as *Waburgia salutaris* in Swaziland and Zimbabwe; and *Albizia brevifolia* in Namibia. Similarly, the commercialization of crafts like baskets and wood curios has led to a decline in tree species such as *Berchemia discolor* which is used as a palm leaf fibre dye in Botswana and Namibia. There has also been over-harvesting of *Afzelia quanzensis* and *Pterocarpus angolensis* in a number of countries in response to the flourishing woodcraft industry. The proportion of threatened plant species in the region ranges from 0.5% in Angola to 40% in Swaziland (Prescott-Allen, 2001).



There is limited information on most of biological resources and ecosystems in terms of their value, status and potential.

2.2.5 Weak institutional and legal frameworks for implementing biodiversity initiatives

National level institutions dealing with biological resources in southern Africa are generally weak in policy formulation; the enforcement of legislation; the provision of management oversight on various resources; and the implementation of requirements of regional and international agreements to which their countries are a party. This can be attributed to inadequate human and financial resources and the relatively lower standing and appreciation of such institutions within most civil service structures. Unfortunately, some of the institutions have not been able to forge partnerships with NGOs and the private sector in order to effectively harness the available national capacities. Similarly, there has been

little effort to collectively harness the human capacity across Member States when dealing with multilateral environment agreements. In addition, local level institutions that deal with biological resources have been weak, especially under communal land tenure systems. However, there are now various attempts to create and/ or strengthen local institutions through capacity building initiatives and land reforms.

Most national policies and legal frameworks that deal with biodiversity issues have the following attributes:

- They have not been effectively enforced. This largely relates to phytosanitary requirements and controls on imports and exports in the case of Invasive Alien Species;
- They do not clearly articulate national and collective positions on TBNRM initiatives that advocate for the removal of barriers to wildlife, domestic animal and human movement within and across countries. This has major implications for animal health and disease control, production and exports in each country (Box 7).
- They tend to focus more on natural resource conservation and not on the need by communities to benefit from the resources, especially in protected areas; and,
- They do not provide guidelines on access to and benefits from biological resources by outside parties.

Despite the foregoing, some progress is being made in formulating legislation that regulates access to biological resources by outside parties. This is illustrated by the case of the Hoodia succulent, *Hoodia gordonii*, a plant with appetite suppressant qualities (Box 8). An important lesson that can be drawn from the Hoodia example is the need for a regional approach to the implementation of access and benefit sharing arrangements. Current estimates of populations of the San people in the region are: 55 000 in Botswana, 35 000 in Namibia, 7 000 in South Africa and approximately 8 000 in Angola, Zambia, and Zimbabwe. The geographical distribution of the plant is primarily in South Africa and Namibia, while related species occur in Angola and Botswana. However, the parties to the benefit sharing discussions were the South African stakeholders in the form of the inventors, CSIR, and the South African San Council (representatives of indigenous knowledge owners in southern African countries, through the Working Group of Indigenous Minorities in Southern Africa-WIMSA).

Box 7: TBNRM and animal disease control

Trans-boundary Natural Resource Management (TBNRM) is defined as any process of cooperation across boundaries that facilitates or improves the management of natural resources for the benefit of all parties concerned. The responsibility for managing TBNRM initiatives lies with the Member States concerned. This is largely because they depend on or assume similar levels of devolution and equally supportive policies and legislation across the participating countries. Consequently, there is need for national consensus, policies and capabilities on the subject.

The control and containment of livestock diseases has, in the past, relied on game fences and the control of wild and domestic animal movements and translocations. The prospect of removing barriers to wildlife and livestock movement therefore has major implications for animal health and disease control strategies under TBNRM. It could also have wider implications for disease control in the participating countries (Osofsky *et al*, 2005). There is therefore need for a policy framework on animal health and disease control under TBNRM.



The prospect of removing barriers to wildlife and livestock movement has major implications for animal health and disease control strategies under TBNRM.

Box 8: The Hoodia succulent and the San people

The San people's traditional knowledge on the Hoodia plant, freely conveyed to anthropologists and researchers many decades ago, provided the crucial lead that guided scientific tests towards the invention and eventual registration of an international family of patents on the treatment of obesity by the South African Council for Scientific and Industrial Research (CSIR) who later licensed Phytopharm in the United Kingdom to undertake further development and commercialization of the invention. In the absence of access and benefit sharing legislation, and as a result of international media expose of the Hoodia case, CSIR and the South African San Council entered into negotiations to develop a Memorandum of Understanding, in recognition of the collective rights of the San as the owners of the indigenous knowledge on the use of Hoodia. The process included workshops that were attended by the San from Botswana and Namibia as well as experts on community development from Canada. The South African San Council was mandated by WIMSA to pursue negotiations in terms of this agreement, which were successfully concluded, and a benefit sharing agreement was signed on 24 March 2003.

The core terms of the agreement are that, the San people will, in the continued success of the product, receive the following (Chennels, 2003):

- * 8% of all milestone payments received by CSIR during the development stages of the project; and,
- * 6% of all royalty payments to be received by CSIR as a result of commercial sales of the anti-obesity product based on Hoodia, for the duration of the patents.



The case surrounding the Hoodia succulent Hoodia gordinii, offers some hope for Regulating access of the region's biological Resources to outside parties.

A regionally coordinated and rationalized approach to the development of *sui generis* legislation in the SADC region will therefore prevent unnecessary competition among Member States, as outsiders will not be able to move from one country to another in pursuit of more favourable access conditions. It is also worth noting that cross border cooperation, investment and trade will create new patterns of resource ownership that will place new and additional demands on national institutions in terms of administration and policy analysis that go beyond project implementation. Consequently, there is need for capacity building in such areas. The Global Environment Facility (GEF), through the Capacity Development Initiative, is supporting a number of assessments of regional and national capacity needs. Such efforts should be strengthened and broadened.

2.2.6 Limited and unsustainable funding for implementing biodiversity programmes.

National government financial allocations to natural resource conservation in the region have continued to decline in real terms. The situation is more critical for certain aspects of biodiversity such as the enforcement of relevant legislation, awareness campaigns and capacity building at various levels. This is, in part, due to insufficient awareness and understanding of biodiversity issues and their implications by policy makers. The position has been worsened by the general decline in development partner support in the field of natural resources and the technical difficulties associated with accessing funding from financing windows such as GEF and the Clean Development Mechanism under the Kyoto protocol. The latter can be partly attributed to inadequate national capacity to prepare sound project proposals. The net result of the funding constraint is the reduced capacity of Member States to conserve and sustainably manage biological resources. At the regional level, financial constraints limit the ability of national agencies to implement trans-boundary programmes. Given such a scenario, Member States should commit more funds to biodiversity issues and develop and implement innovative financing mechanisms.

2.2.7 Inadequate research and development approaches for implementing biodiversity programmes.

Throughout southern Africa, expenditure on research and technology development is way below 1% of the GDP. In addition, very few to no incentives are offered to the private sector to encourage it to invest in R & D. Furthermore, most development models in the region have considered biological resources as a source of sustenance and not as a source of wealth. The foregoing scenario largely explains the limited R & D attention that has gone into areas such as value addition, bio- prospecting,

policy and institutional analysis, appropriate development models and targeted research into emerging issues such as the wildlife, livestock and human interphase under TBNRM. The latter is elaborated in Box 9.

Bio-prospecting (the examination of biological resources such as plants, animals and micro-organisms, for genetic traits that may be of value for commercial development) offers opportunities for enhancing the economic value of biological resources of the region. However, there has been very little investment in R&D in this area, other than through the Bio-prospecting Programme at the Council for Scientific and Industrial Research (CSIR) in South Africa. This Programme, established in 1990, undertakes bio-prospecting funded through the on-going investment by the South African government in strategic research at CSIR. A recent development of note is that the Namibian government, through the Ministry of Agriculture, Water and Rural Development, signed a Memorandum of Agreement with CSIR to access the bio-prospecting R&D expertise of the organization with the aim of creating economic opportunities for Namibia based on its indigenous plants.

Box 9: The wildlife, livestock and human interface under TBNRM (Cumming & WCS AHEAD, 2004)

Animal health issues, coupled with very high expectations for development benefits from wildlife-based tourism under TBNRM provide a unique opportunity for targeted interdisciplinary research to contribute to these expectations. This development, over such a large landscape, also provides an exceptional opportunity to conduct research at the interface between wildlife, livestock, human communities and varied social-ecological systems in terms of health and the provision of ecosystem goods and services; and in so doing to work towards sustainable improvements in human health and livelihoods from local to regional scales. Furthermore, there is an opportunity to establish a framework that fosters a synergistic partnership between farmers, natural resource managers and researchers on one hand, and government and non-governmental agencies involved in animal and human disease control, conservation, agriculture and rural development on the other.

Given the high costs and level of expertise needed in R & D efforts, there is need for partnerships with local, regional and international NGOs, the private sector and international cooperating partners.

2.2.8 Limited attention to the management of Genetically Modified Organisms and Invasive Alien Species

Genetically Modified Organisms and Invasive Alien Species have assumed greater significance in discussions and work programmes of the Conference of Parties to the CBD. They are also emerging as important current and potential constraints to biodiversity conservation and its sustainable use in southern Africa. It is against this background that the limited attention given to their management is considered a high priority constraint in the region.

a) Genetically Modified Organisms

Among the impacts of economic liberalization; the quest for high agricultural productivity; and recurrent droughts in southern Africa, has been an increase in the imports of Genetically Modified Organisms (GMOs), which are products of biotechnology. GMOs have the capacity to boost the

world's food supply in the face of increasing human populations, especially in developing countries. Within the region, GMOs have mostly come in the form of food aid and improved plant germplasm.

Like any other technology, GMOs can adversely affect local plant germplasm, human health and the environment if not properly handled. Consequently, security measures have to be designed to minimize the risk involved in the transfer, management, use and liberation of GMOs for sustainability reasons. Such measures are referred to as "biosafety". Unfortunately, only seven of the thirteen SADC Member States have signed the Cartagena Protocol on Biosafety and five have acceded to it. This protocol regulates the way and conditions under which GMOs can cross national borders. It would therefore be to SADC's advantage if all its Member States signed the protocol.

SADC has no policy on dealing with GMOs but it has developed guidelines on the subject (Box 10). For example, during the 2002-3 drought, the region imported some GM maize to offset part of its food deficit of 3.3 million metric tonnes. While some Member States rejected the grain on grounds that they lacked a national policy framework to deal with GMOs, others received it and fed their hungry citizens. This lack of a coherent regional policy framework on GMO imports could have long-term implications on SADC's maize germplasm that could have been polluted by the imports. Furthermore, SADC citizens were not adequately educated on the potential adverse effects of the GM food on human health to enable them decide on whether or not to consume the grain. Consequently, there is need for national and regional policy frameworks and awareness strategies on GMOs. It is therefore interesting to note that some Member States have or are in the process of developing legislation on biosafety.

Box 10: SADC Guidelines on GMOs

In 2003, SADC developed guidelines on GMOs, biotechnology and biosafety. They cover the following areas: handling of food aid, policy and regulations, capacity building and public awareness and participation. The guidelines urge Member States to develop national biotechnology policies and strategies and to sign and ratify the Cartagena Protocol. In addition, they encourage the region to develop a harmonized policy and regulatory framework based on the African Model Law on Biosafety, the Cartagena Protocol and other relevant international processes.

b) Invasive Alien Species

Invasive Alien Species (IAS) are species introduced deliberately or unintentionally outside their natural habitats where they have the ability to establish themselves, invade, out-compete natives and take over the new environments (IUCN, 2000). The globalization of markets and increases in global trade, travel and tourism are conveying more species from and to all parts of the world. This has enhanced chances of bio-invasions across ecosystems with economic costs to agriculture, forestry, fisheries and other economic sectors as well as on human health and general welfare. Some of these costs include direct costs of prevention, control and mitigation. Apart from reducing biodiversity, IAS threaten the integrity of ecosystems (Box 11).

Box 11: IAS threaten the integrity of ecosystems

The invasion of some of the region's water bodies by the water hyacinth has modified fish habitats as the weed changes and degrades aquatic water systems, outgrows local water plants and takes over. When massive quantities of the plant die, they sink to the

bottom and their decomposition deoxygenates the water resulting in the death of fish. Their debris also affects drainage systems and watercourses. Furthermore, the weed's dominant cover absorbs sunlight thereby seriously affecting the biodiversity of fauna and flora beneath the water level. The water hyacinth is a major problem in Malawi, South Africa, Tanzania, Zambia and Zimbabwe. Other important waterweeds in the region include *Salvinia molesta*, *Pistia stratiotes* and *Azolla filiculoides*.

Notwithstanding the foregoing, there is limited to no information on the extent and impact of most IAS in the region, which also include invasive pathogens such as bovine tuberculosis, for example. Furthermore, there has been no comprehensive and coordinated strategy on the prevention, eradication and control of invasives. At the national level, the enforcement of legislation that deals with IAS has been rather weak and uncoordinated. This has contributed to the unchecked proliferation of IAS.

It is also worth noting that citizens of the region have not been adequately educated on the presence and adverse effects of IAS for them to effectively participate in their prevention and control. Furthermore, there has been very little effort to turn the IAS problem into an economic opportunity. This is against a background that the majority of species used for economic benefit in agriculture, forestry and fisheries are alien to the region. Unfortunately, the utility value of IAS found in southern Africa remains largely unexplored and unresearched.



Invasive Alien Species are the single greatest threat to aquatic ecosystems in Southern Africa

3.0 Regional Biodiversity Strategy

The Regional Biodiversity Strategy is presented in the form of a matrix that highlights strategies to address the eight priority regional constraints and the focal areas (sets of activities) for specific project development. No attempt is made to develop an action plan. Rather, steps that move the Regional Strategy into the implementation mode in terms of specific project proposal development and financial resource mobilization are presented. This provides the required flexibility in its implementation given the complexity and crosscutting nature of biodiversity issues and the wide range of stakeholders involved.

3.1 Scope

The Regional Strategy consists of the following three broad strategic areas:

First, enhancing the region's economic and business base by adding value to and commercializing its biological resources; and broadening and diversifying its industrial and manufacturing base (Box 12). This is in recognition of the fact that business creates wealth and wealth fights poverty. Economic diversification will be achieved by seeking and establishing "green markets" for value added biodiversity products. The "Biotrade" will be tackled within the context of existing regulations and agreements that govern international trade in biological products. This development will be linked to certification in order to guard against the unsustainable harvesting and exploitation of the resource.



Among the broad strategic areas of the Regional Biodiversity Strategy is the enhancement of the region's economic and business base by adding value to and commercializing its biological resources.

Box 12: Broadening and diversifying the region's industrial and manufacturing base.

The need to explore other livelihood opportunities and to refocus national policy development models beyond the primary sectors of production in the region cannot be over-emphasized. In fact, this is the development route that was followed by the currently developed nations. This highlights the fact that natural resources alone are not a panacea to the region's development problems. However, it is worth noting that the issue of alternative livelihoods goes beyond the scope of this Regional Biodiversity Strategy. Rather, it should be pursued as a cross cutting issue throughout SADC economies.



The need to explore other livelihood opportunities and to refocus national policy development models beyond the primary sectors of production such as agriculture in the region cannot be overemphasized.

Second, ensuring that economic opportunities that emerge from “biotrade” and economic diversification do not lead to the unsustainable use of the region’s biodiversity and result in the loss of biological resources and ecological processes. This will be achieved through regular resource inventories and monitoring; broadening the resource base; establishing effective institutional and legal frameworks; and promoting Access and Benefit Sharing (ABS) principles. The latter will include the formulation of a *sui generis* legislation that protects local knowledge and germplasm from biopiracy. Other important areas include the development of a regional biodiversity policy and protocol; and the promotion of mutually beneficial partnership models between local communities, governments and the private sector. The models will be promoted within the context of CBNRM and TBNRM initiatives in protected and non-protected areas. All development projects will be encouraged to implement mitigatory measures contained in their Environmental Impact Assessment (EIA) reports. This will go some way in mainstreaming biodiversity into the economic and development activities of the region. In addition, a Regional State of Biodiversity report will also be produced every ten years to assess biodiversity trends.

Third, developing and implementing biodiversity awareness, information and capacity building programmes; research and development initiatives; and sustainable financing arrangements. This will underpin the economic and sustainable use thrusts of the Strategy. Establishing expert networks and Lead Institutions or Centres of Excellence in specified areas; estimating the economic values of various biodiversity products and services; establishing and/or strengthening existing databases; and appropriately packaging and disseminating biodiversity information will achieve the awareness, information and capacity building aspects of the Regional Strategy. R&D work will focus on technologies that increase the size and productivity of biological resources; on generating value addition and processing technologies; and on bio-prospecting. With respect to funding, emphasis will be on developing and promoting ‘best practices’ on innovative financing and on mainstreaming biodiversity into sector projects and programmes at national and regional levels.



Among the broad strategic areas of the Regional Biodiversity Strategy is the development & implementation of biodiversity awareness, information & capacity building programmes.

Box 13 and Table 2 present the 50 focal areas (sets of activities) of the Regional Biodiversity Strategy. They explicitly address each of the eight priority constraints to biodiversity conservation and its sustainable use in southern Africa. Although R & D is treated as an independent constraint in Table 2, it cuts across most of the other constraints addressed by the Regional Strategy. In addition, a number of focal areas apply to more than one regional constraint (see Box 13).

Box 13: Cross cutting focal areas of the Regional Strategy

Focal areas that apply to a number of regional constraints include the following:

- i) Create and/or strengthen databases on selected biodiversity components at regional and national levels and establish linkages between them.
- ii) Establish and strengthen regional Lead Institutions or Centres of Excellence that offer education and training on specific aspects of biodiversity to targeted stakeholders.
- iii) Develop the human and infrastructural capacity to inventory/collate, monitor and store biodiversity information at various levels. In addition, use this information to generate knowledge for dissemination to decision makers and other key stakeholders.
- iv) Establish regional and national rosters of experts in specific areas of biodiversity and facilitate their interaction.
- v) Conduct training and staff needs assessments on key components and areas of biodiversity and develop and implement appropriate capacity enhancement programmes.
- vi) Create a conducive environment for public-private sector partnerships.

Table 2: Constraint- based Regional Biodiversity Strategy: overview of strategies and focal areas.

Constraint	Strategy	Focal area
1. Increased pressure and demand on biodiversity and agricultural land due to limited alternative livelihoods outside agriculture and natural resource exploitation.	a) Facilitate the development and implementation of affordable, viable and acceptable alternatives for economic development and human survival.	<p>i) Facilitate technological advancement in agriculture and accelerate the commercialization of smallholder agriculture.</p> <p>ii) Build capacity (including technological capacity) and provide incentives for the development of small-scale enterprises to add value “at source”.</p> <p>iii) Develop and promote affordable and accessible alternative energy sources.</p> <p>vi) Broaden the forest, fish and wildlife resource base to meet increasing demands.</p>
2. Inadequate biodiversity inventory and monitoring systems, and knowledge on and ability to handle biodiversity information.	a) Develop and implement comprehensive but simple biodiversity inventory and monitoring programmes covering key species of flora, fauna and habitats; and skills to handle and package the information, leading to improved knowledge and better management of biodiversity.	<p>i) Review and harmonize current biodiversity inventory and monitoring methods to accommodate trans-boundary initiatives, including coastal and marine ecosystems and wetlands.</p> <p>ii) Incorporate indigenous knowledge into biodiversity inventory and monitoring systems at local level, taking cognizance of transition matrices to develop larger frameworks.</p> <p>iii) Undertake regular inventories and monitor key biodiversity components at species and ecosystems levels using a regionally agreed framework.</p> <p>iv) Ensure the implementation of mitigatory measures contained in Environmental Impact Assessment (EIA) reports for trans- boundary development initiatives, coastal and marine ecosystems, wetlands and large national projects. This will contribute towards mainstreaming biodiversity into the key economic and development sectors.</p> <p>v) Develop and/or strengthen regional and national capacities to conduct EIAs.</p> <p>vi) Promote and strengthen the <i>ex situ</i> conservation of threatened species at national and regional levels and link it to <i>in situ</i> conservation efforts at the</p>

		<p>appropriate levels (e.g. on farms and in protected areas, including marine parks).</p> <p>vii) Produce a Regional State of Biodiversity Report once every ten years. The report should have a clear and articulated account of what is good or acceptable according to agreed standards, and indicate what and by when it should be ameliorated, where possible.</p> <p>viii) Incorporate data on biological diversity within the framework of an Integrated Land Use Assessment that links data sets on demography, socio-economic conditions and agriculture.</p>
<p>3. Inadequate incentives for biodiversity conservation and its sustainable use.</p>	<p>a) Enhance the economic value of biological resources and develop mechanisms to equitably share resultant benefits.</p>	<p>i) Add value and commercialize various biological resources and facilitate public-private sector partnerships.</p> <p>ii) Develop and promote cottage industries for commercialized biological resources</p> <p>iii) Invest in value addition and processing technology.</p> <p>iv) Develop appropriate legal and institutional frameworks for equitably sharing benefits from genetic resources, including the protection and promotion of indigenous knowledge systems through <i>sui generis</i> type legislation.</p> <p>v) Develop and implement appropriate partnership and marketing models and Access and Benefit Sharing (ABS) principles for biodiversity components in protected and non-protected areas (e.g. "important bird areas" for threatened bird species).</p> <p>vi) Establish "best practices" on selected aspects of ABS and develop regional guidelines and/or protocols.</p> <p>vii) Provide market intelligence for various community level biological products and protect community rights and indigenous knowledge.</p>

4. Low levels of awareness, knowledge and appreciation, including the value of biological resources, at various levels.	a) Enhance awareness, information and knowledge on biological resources at various stakeholder levels.	i) Conduct economic valuation studies for various biodiversity products and services (i.e. measuring the costs and benefits of actions that affect biodiversity) and explore opportunities to enhance their contribution. ii) Appropriately package and disseminate information on various biological resources and emerging issues to targeted stakeholders using various channels, including the print and electronic media.
5. Weak institutional and legal frameworks for implementing biodiversity initiatives.	a) Strengthen institutional and legal frameworks for implementing biodiversity initiatives.	i) Review existing institutional and legal frameworks on selected biodiversity components and develop regional guidelines and protocols on “best practices”. ii) Enhance the capacity of Member States to enforce relevant pieces of legislation at local, national and regional levels; and promote incentive based regulations such as the certification of “Bio products”. iii) Formulate and operationalize a regional biodiversity policy and protocol. iv) Facilitate the development of national consensus, policies and capabilities on trans- boundary initiatives, including a policy framework on plant and animal health in Trans-frontier Conservation Areas (TFCAs).
6. Limited and unsustainable funding for implementing biodiversity programmes.	a) Provide a sustainable and readily accessible financial base to support biodiversity programmes.	i) Review existing innovative financing mechanisms for biodiversity initiatives in Member States and beyond and formulate regional guidelines on “best practices”. ii) Mainstream biodiversity into sector policies, programmes and projects at national and regional levels. iii) Establish Trust Funds to support specific biodiversity projects at national and regional levels. iv) Improve the capacity of Member States to access funds from existing multilateral environment agreements such as the CBD, UNCCD and the UNFCCC.

<p>7. Inadequate R&D approaches for implementing biodiversity initiatives.</p>	<p>a) Develop appropriate R&D approaches for implementing biodiversity initiatives.</p>	<p>i) Evaluate and improve upon existing approaches and develop and test new models on TBNRM and CBNRM initiatives and on ABS and IAS under protected and non-protected areas. ii) Conduct research on increasing the size and productivity of selected biological resources. iii) Conduct multi-disciplinary research on plant and animal health in TFCAs, including linkages with human health and livelihoods. iv) Invest in domestication and production technologies of key species such as medicinal plants and indigenous fruit trees. v) Conduct research on trade-offs between conservation and livelihoods in protected areas, and provide guidelines on the optimal extent and scale of protected areas under different conditions, such as key natural ecosystems. vi) Undertake R&D in bio-prospecting.</p>
<p>8. Limited attention to the management of Genetically Modified Organisms (GMOs) and Invasive Alien Species (IAS)</p>	<p>a) Improve the region's capacity to manage GMOs</p> <p>b) Improve the region's capacity to prevent, eradicate and control IAS.</p> <p>c) Improve the regions capacity to manage IAS and GMOs</p>	<p>i) Develop national and regional policy and legislative frameworks for dealing with GMOs. ii) Build national and regional capacities to handle GMO related issues including, human health.</p> <p>. i) Identify and map out the geographical spread of problematic IAS in the region. ii) Explore possibilities of turning the IAS problem into an economic opportunity. iii) Evaluate the synergistic effects of land degradation and climate change on the spread of IAS.</p> <p>i) Establish the actual impact of IAS/GMOs on other biodiversity and economic activities. ii) Conduct studies to establish “best practices” in the management of IAS/GMOs and promote them. iii) Develop regional guidelines and/or protocols on the management and</p>

		monitoring of IAS/GMOs. iv) Collate and disseminate information on GM foods and on IAS to various stakeholders.
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The 50 focal areas cut across the traditional biodiversity sectors of forestry, wildlife, aquatic life and agriculture. They also address key challenges identified in the RISDP, the NEPAD Environmental Action Plan and the MDGs and have the following attributes:

- A number of them (e.g. resource inventories, monitoring and environmental impact assessments) have a largely national focus. However, they provide useful building blocks for regional actions;
- Some of them are being addressed by on-going regional initiatives. For such focal areas, emphasis will be on creating synergies (through joint ventures) or just strengthening current initiatives during the Regional Strategy's project proposal development phase. For example, a considerable amount of work is being carried out on TFCAs with support from regional NGOs and international cooperating partners. Such work should be considered as an important entry point, especially since poverty and HIV/AIDS prevalence maps in the region show high rates in communities around protected areas (Dikobe personal com.); and,
- Most of them impact on a number of international conventions to which SADC Member States are party. Consequently, the development and implementation of specific projects emanating from them present practical opportunities for facilitating linkages across relevant multilateral environment agreements in the region.

3.3 Implementation framework

3.3.1 Policy and institutional issues

The Regional Biodiversity Strategy comes at a time when SADC and its Member States have no clear underlying policy framework on biodiversity issues. It will therefore be implemented under the auspices of NBSAPs and other relevant national planning frameworks in the Member States.

At the regional level, it will be anchored on the following:

- Policy interventions for “Sustainable Food Security” and “Environment and Sustainable Development” as articulated in the RISDP. Entry points into these interventions will become clearer once a regional biodiversity policy and protocol have been developed as envisaged in the Regional Strategy. In addition, the Regional Strategy will feed into the NEPAD Sub-regional Environment Action Plan for southern Africa, currently under formulation.
- Regional protocols such as those on forestry, wildlife, fisheries, energy, trade, shared watercourse systems, health and education and training. These legal instruments contain elements of biodiversity.

Institutionally, the Regional Strategy will operate within the framework of existing SADC structures (Box 14). At the regional level, it will be coordinated under the umbrella of the SADC Secretariat through the Food, Agriculture and Natural Resources (FANR) Directorate. Among other units, the directorate houses the agriculture, forestry, wildlife and aquatic life sectors. These sectors will provide coordination and facilitation oversight to resultant regional projects that fall under them. At national level, linkages will be established between the Regional Strategy and relevant biodiversity sectors (viz. forestry, wildlife, aquatic life and agriculture). These sectors and their partners will be responsible for implementing projects that emanate from the Regional Strategy. Given that the Regional Strategy was derived from constraints contained in NBSAPs, such an arrangement will complement rather than compete with related national initiatives. Furthermore, the use of existing national and regional institutional arrangements will ensure the speedy implementation of the resultant projects. Notwithstanding, some of these institutions might need some strengthening, depending on the project and the implementing sector. It is, however, worth noting that the sector approach does not capture cross sector synergies and contradictions, as is the case with an ecosystems approach. Unfortunately, the latter is still evolving in the region and no appropriate institutional frameworks currently exist for its implementation.

Box 14: The evolution and structure of the SADC Secretariat

The SADC Secretariat has been undergoing institutional and programmatic restructuring since 2002. This resulted in the centralization of the 21 Sector Coordinating Units that were formerly located in the coordinating Member States. Four directorates namely Food, Agriculture and Natural Resources (FANR); Trade, Investment and Finance; Infrastructure and Services; and Human Resources and Special Programmes were created to accommodate the sectors. Biodiversity falls under the Environment sector/unit of the FANR directorate.

SADC National Committees (SNCs) will provide the link between the SADC Secretariat and the relevant national sectors during project implementation. They will be responsible for disseminating information on the Regional Strategy and its resultant projects as well as their implementation and monitoring within Member States. In addition, SNCs will ensure the broad and inclusive participation of key stakeholders at that level.

Regarding the implementation of approved and funded projects generated from the Regional Strategy, SADC will engage Executing Agents. The Agent will be responsible for the day-to-day operational management and supervision of the project through the relevant implementing sector at national level. Essential characteristics of an Executing Agent include: in-depth technical know how in the particular area; demonstrated programme management capabilities; and general acceptability by Member States, cooperating partners and other key stakeholders.

Operationally, the Agent will receive policy and technical oversight from a Programme Steering Committee. The committee will consist of representatives of Member States, the SADC Secretariat, international cooperating partners and other relevant stakeholders as necessary.

3.3.2 Implementation modalities

The operationalization of the 50 focal areas of the Regional Biodiversity Strategy will depend on the availability of both internal and external funding hence the interests of the funding sources will influence their sequencing. The following activities will be undertaken in implementing the Regional Biodiversity Strategy:

First, SADC will extensively and continuously market the Regional Strategy to various stakeholders and partners.

Second, SADC will continuously encourage local, regional and international NGOs and private sector entities to, independently or jointly with it, mobilize resources for implementing new or strengthening existing projects in their preferred focal areas.

Third, the SADC Secretariat and partners will develop concept notes and detailed project proposals within the focal areas, taking cognizance of on-going initiatives. To achieve this, the Secretariat will, individually or collectively with its development partners, consider the creation of a short-term position of a Biodiversity Projects Coordinator. This is in recognition of the small personnel establishment within the Secretariat and the need to complement it in order to “jump start” the implementation of the Regional Strategy. The Coordinator will lead the project proposal development process and mobilize financial resources. The resultant proposals will be submitted to interested development partners for consideration and possible financial support as they come on stream. This will ensure that some project work comes on stream sooner rather than later and will help to maintain the interest of Member States on the initiative.

Fourth, SADC will review the Regional Biodiversity Strategy every five years to assess the extent of its implementation and to incorporate new and emerging issues.

ANNEXES

ANNEX I: INTRODUCTION

This Annex provides a conceptual framework within which the Regional Biodiversity Strategy was crafted. It highlights that the Regional Strategy is anchored on the Regional Indicative Strategic Development Plan (RISDP), the New Partnership for Africa's Development (NEPAD) Environment Action Plan and the Millennium Development Goals (MDGs). The Annex summaries the biodiversity situation in the region and gives a justification for the Regional Biodiversity Strategy. The methodology followed in developing the Regional Strategy is then presented.

1.1 Background

The Southern African Development Community (SADC) consists of thirteen Member States located in the southern part of the African continent. They are Angola, Botswana, the Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. The Community's role has evolved from the time of political liberation in the 1970s to economic cooperation and integration in the 1990s. This evolution is reflected in its vision of "a common future for all countries and peoples of southern Africa" (Box 1.1). The vision is anchored in the determination of SADC to confront underdevelopment and marginalisation in an increasingly globalised world by jointly addressing mutual aspirations and problems. Consequently, there is considerable political will for trans-boundary cooperation in southern Africa. To operationalise this, SADC Heads of States and Governments adopted the Regional Indicative Strategic Development Plan (RISDP) in 2004. The Plan is a vehicle for achieving the Community's goals of social and economic development and poverty eradication. SADC is also committed to the ideals of the New Partnership for Africa's Development (NEPAD). NEPAD is a programme of the African Union designed to meet the development objectives of its Member States. It has identified democracy and political governance, among other things, as essential prerequisites for achieving sustainable development in Africa. One of the key principles of the RISDP and NEPAD is the need to closely link their agenda with the Millennium Development Goals (Box 1.2).

Box 1.1 The SADC Vision

"The SADC vision is one of a common future, a future in a regional community that will ensure economic well-being, improvement of standards of living and quality of life, freedom and social justice and peace and security for the peoples of southern Africa. This shared vision is anchored on the common values and principles and the historical and cultural affinities that exist between the peoples of southern Africa" (SADC, 2004).

Table 1.1 presents some key socio-economic statistics on SADC Member States. According to the table, the countries are at different stages of economic development with South Africa having the largest and dominant economy in terms of Gross Domestic Product (GDP). Economic performance in the region has remained fragile as countries continue to be exposed to natural disasters and adverse external shocks. This is partly because most of their economies are dependent on the primary sectors of production. Only South Africa and Mauritius have sizeable manufacturing sectors that account for 25% of their GDP (SADC, 2004). Furthermore, between 40% and 85% of the region's citizens live in rural areas where they depend on natural resources for survival. This underpins the overriding importance of biological resources in southern Africa.

Box 1.2 Millennium Development Goals

The Millennium Development Goals (MDGs) are an ambitious agenda for reducing poverty and improving human lives that world leaders agreed on at the Millennium Summit in September 2000. They are: eradicate extreme poverty and hunger; achieve universal primary education; promote gender equity and empower women; reduce child mortality; improve maternal health; combat HIV/AIDS, malaria and other diseases; ensure environmental sustainability; and, develop global partnerships for development. Specific targets and time frames were set for each goal.

Table 1.1 Some key socio-economic statistics on SADC Member States

Country	GDP (US\$ billion)	GDP per capita (US\$)	Population (million)	Urbanization (%)
Angola	9.76	696.9	14.0	42.4
Botswana	6.50	2 796.0	1.7	46.0
DRC	5.28	96.1	54.9	60.0
Lesotho	0.79	366.0	2.2	17.0
Malawi	2.28	198.0	11.5	15.0
Mauritius	4.83	3 953.0	1.2	43.0
Mozambique	4.09	226.0	18.1	23.0
Namibia	2.82	1 667.0	1.8	27.0
South Africa	159.90	3 452.0	46.4	56.0
Swaziland	1.22	1 109.0	1.1	22.6
Tanzania	9.74	266.0	33.6	30.0
Zambia	4.34	392.0	10.7	35.0
Zimbabwe	22.00	1 891.0	11.6	33.6

Source: Maskew Miller Longman Group & SADC Secretariat (2003) & National Statistical Yearbooks.

Over 50% of the GDP of SADC Member States comes from primary sectors of production such as agriculture, mining, forestry and wildlife. However, although the region is endowed with natural resources, it is characterized by high levels of poverty that emanate from its inability to effectively transform this natural resource capital into goods and services for social and economic development and poverty eradication. Furthermore, southern Africa is facing serious environmental challenges largely originating from increasing human population relative to resource availability; agricultural expansion coupled with declining land productivity; continued reliance on wood fuel; increasing land degradation; climate change; and continuing erosion of human capacity through HIV/AIDS.

It is against the foregoing background that the RISDP embraces the ideals of the NEPAD Environment Action Plan. The latter was crafted on the realization that Africa is the only continent where poverty is expected to rise during the twenty first century and that its reduction depends on good stewardship of the environment. The NEPAD Environment Action Plan therefore addresses major environmental issues and challenges faced by the continent as a whole (Box 1.3). The Plan will be implemented through the NEPAD Sub-regional Environment Action Plans that recognize regional differences and location specific circumstances in programme development and implementation but still subscribe to a set of agreed upon sustainable management principles.

To operationalize the biodiversity components of the RISDP and the NEPAD Environment Action Plan, SADC is developing a Regional Biodiversity Strategy. The Strategy is underpinned by the recognition that the state of the environment (which includes biodiversity) is a major determinant of the growth and development of the region and affects the living standards of its citizens. Consequently, addressing environmental issues and challenges is a necessary condition for achieving SADC's goals. The Regional Strategy will assist in enhancing or building capacity to implement trans- boundary initiatives related to biodiversity conservation and its sustainable use in southern Africa. In this regard, it will complement the NEPAD Sub-regional Environment Action Plan for southern Africa, currently under formulation.

Box 1.3 Major environmental issues and challenges in Africa (UNEP, 2003).

- ✓ The basic problem of persistent degradation of the environment and increasing loss of natural resources;
- ✓ Decreasing natural habitats and fragile ecosystems precipitating diminishing diversity of species;
- ✓ The exploitation of natural resources is accelerating at an unsustainable rate that is higher than the rate of replenishment and/or replacement;
- ✓ Land degradation as well as natural and human induced environmental disasters continue to pose a great problem to the continent and her citizens;
- ✓ The severity of environmental problems is a major contributor to the problem of poverty and dismal growth performance of Africa; and,
- ✓ There appears to be lack of appropriate recognition by the political leadership of the importance and severity of the problem of the environment, an issue that probably accounts for inadequate attention being paid to the subject matter.

1.2 Biodiversity in southern Africa

The Convention on Biological Diversity (CBD) defines biodiversity as the variation between ecosystems and habitats; the variation between different species; and the genetic variation within individual species. According to Johnson (1995) it can be thought of as a system of interactions between genes, species, and the ecosystems they form, influencing and influenced by ecological and evolutionary processes. Thus, diversity exists at three main levels: the combination of species that make up different ecosystems; the number of different species; and the different combination of genes within species. All the three levels help to sustain biological systems, as well as ensure their productivity. Biodiversity drives the economies of SADC Member States through the economic resources and ecological services it provides. Consequently, its restoration, maintenance or enhancement should not be viewed as an end in itself, but as a means to achieve the region's socio-economic development.

Southern Africa is rich in biological resources, some of which have global significance (Table 1.2). It has a large and diverse heritage of flora and fauna, including domesticated crops. They are found in the region's varied environments that include arid and semi arid ecosystems; mediterranean-type ecosystems; coastal, marine and freshwater ecosystems; and mountain ecosystems. According to Griffin *et al* (1999), the region is characterized by a high country species richness (e.g. in Angola and South Africa); and a wide range of sites of high endemism such as Lake Malawi, Succulent Karoo (Sperrgebeit/Richterseveld), Cape Floristic Region and the Maputoland/ Pondoland/Albany. Of the 82 sites globally chosen for their species richness and endemism in sub Saharan Africa, 26 fall within the SADC region. In addition, more than 40% of the species found in southern Africa are endemic. Some of these biological resources have global significance for the world's climate and for the development of agricultural and industrial activities.

Table 1.2 Species diversity in southern Africa

Country	Area (000 sq km)	Mammals	Birds	Fish	Flowering plants
Angola	1 247	275	872	268	5 000
Botswana	582	154	569	81	2 000
Lesotho	30	33	288	8	1 576
Malawi	118	190	650	1000	6 000
Mozambique	799	216	735	500	5 500
Namibia	824	154	640	97	3 159
South Africa	1 219	247	774	220	20 300
Swaziland	17	47	496	45	2 636
Tanzania	945	310	1 016	250	11 000
Zambia	753	229	732	156	4 600
Zimbabwe	390	196	634	132	6 000

Source: Cumming (1999) & National consultations.

Throughout centuries the peoples of southern Africa have depended on the region's rich biodiversity for survival. They have developed strategies to protect and conserve this natural heritage for the benefit of their own and future generations. For example, some cultures often designated areas rich in biodiversity as sacred or protected areas for a variety of reasons. However, most of these conservation sensitive traditional beliefs and customs are rapidly breaking down due to population pressures and changes in the socio-economic environment, including urbanization. The impact of such changes on biological and cultural diversity cannot be over-estimated

1.3 The Convention on Biological Diversity

The objectives of the CBD are the conservation of biodiversity; the sustainable use of its components; and the equitable sharing of benefits from the use of genetic resources. The Convention stresses the need to promote regional, and global cooperation on these issues. In addition, it requires parties to cooperate on matters of "mutual interest" related to biodiversity conservation and its sustainable use. It also establishes an international structure for continued cooperative research, technology transfer, information exchange assistance, and monitoring and assessing the implementation of the Convention. It further requires developed countries to provide financial support for the implementation of the Convention by developing countries. A funding mechanism, the Global Environment Facility (GEF) is in place and is administered by the World Bank and the United Nations Development Programme (UNDP) on behalf of donor countries.

The CBD was signed by 150 governments at the close of the United Nations Conference on Environment and Development in June 1992. As of March 2005, it had been ratified

or acceded to by 188 countries and the European Union. All SADC Member States are Parties to the Convention which requires parties to:

- Inventory national biodiversity;
- Integrate biodiversity protection into relevant policies and programmes;
- Identify and monitor activities that harm biodiversity, and protect biodiversity through a range of measures that include the creation of protected areas and the implementation of regulations and incentives aimed at ensuring its sustainable use; and,
- Develop National Biodiversity Strategies and Action Plans (NBSAPs).

The first stage in the development of a NBSAP is the preparation of a Country Study document, which presents the status of biodiversity in a country. It also evaluates the importance of biodiversity to the national economy and highlights the various threats to biodiversity and their significance. This is followed by extensive stakeholder consultations during which the NBSAP is formulated. Table 1.3 shows the status of Member States with respect to ratifying the Convention and formulating NBSAPs. According to the table, all countries have ratified the CBD and the majority have completed their NBSAPs. The latter provide useful building blocks for addressing trans-boundary biodiversity issues at the regional level.

Table 1.3 Status of Member States on aspects of the CBD

Country	Date ratified	Status of NBSAP
Angola	01 April 1998	Under preparation
Botswana	12 October 1995	Completed
Lesotho	10 January 1995	Completed
Malawi	02 February 1994	Completed
Mozambique	25 August 1995	Completed
Namibia	16 May 1997	Completed
South Africa	02 November 1995	Completed
Swaziland	09 November 1994	Completed
Zambia	28 May 1993	Completed
Zimbabwe	11 November 1994	Completed
Tanzania	08 March 1996	Completed
DRC	03 December 1994	Completed
Mauritius	04 September 1992	Completed

1.4 The need for a Regional Biodiversity Strategy

Most of the biodiversity of southern Africa transcends national boundaries. In addition, a few species of mammals, birds, butterflies and fish exhibit trans-boundary migration patterns. However, the region's biodiversity is under threat from a variety of sources that include population growth, agricultural expansion, continued reliance on wood fuel and land degradation. These threats are leading to the loss of biological resources and

ecological processes. Regional cooperation is therefore essential to effectively address such threats; maintain the integrity of ecosystems that transcend national boundaries; and ensure that natural resources continue to contribute to the socio- economic development of southern Africa. It is against this background that ten of the thirteen SADC Member States namely Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe are participating in the SADC Biodiversity Support Programme (BSP), whose implementation started in 2000. The Programme was refocused in 2003 following a Mid Term External Evaluation.

The purpose of the refocused SADC BSP is to establish and/or enhance capacity and institutional mechanisms that enable SADC Member States to collaborate in regional biodiversity conservation; to prevent or control the spread of Invasive Alien Species (IAS); and to apply Access and Benefit Sharing (ABS) principles (Timberlake *et al*, 2003). The GEF provides financial resources to the Programme. The Programme receives administrative oversight from the United Nations Development Programme (UNDP) and technical support from IUCN-the International Union for the Conservation of Nature.

One of the expected outputs of the SADC BSP is a Regional Biodiversity Strategy. The Regional Strategy will provide a framework for regional cooperation on biodiversity issues that transcend national boundaries, including IAS and ABS in all SADC Member States. However, the Strategy does not assume the individual country responsibilities under the Convention.

1.5 Methodology used.

The SADC BSP Regional Steering Committee, through a Task Force, spearheaded the development of the Regional Biodiversity Strategy. The key steps followed were: situation analysis; prioritization of constraints; and the formulation of a constraint-based Regional Strategy. There was constant forward and backward movement between the three steps to obtain stakeholder consensus and accommodate emerging issues. The rationale for adopting a constraint-based approach was that constraints (encompassing policy, institutional and technical considerations) determine what people can do, want to do and end up doing. For example, they determine the biodiversity and complementary resources that SADC citizens can individually or collectively access and use for their livelihood and development; their knowledge and skills to use such resources; and their motivations. Motivations determine the benefits and ways in which citizens utilize the knowledge, skills and resources they have or can access (Navarro, personal com.).

1.5.1 Situation analysis

Extensive literature searches were carried out. They focused on the status of biodiversity, threats to it and opportunities for its conservation and sustainable use in the region. Among the information sources used were:

- National planning frameworks including National Biodiversity Strategies and Action Plans (NBSAPs); Poverty Reduction Strategy Papers; National

Conservation Strategies; National Environment Action Plans; and State of the Environment Reports;

- Regional and Africa wide instruments such as the RISDP; Regional protocols and conservation programmes; Reports on the State of the Environment in southern Africa; and the NEPAD Environment Action Plan; and,
- Relevant international instruments and frameworks such as the CBD, Millennium Development Goals, the World Summit on Sustainable Development and the World Parks Congress.

1.5.2 Prioritization of regional constraints

The situation analysis highlighted a number of national level constraints to biodiversity conservation; its sustainable use; and equitable sharing of benefits as articulated in the NBSAPs and other relevant national planning frameworks. A regional consultative workshop was subsequently convened in Swaziland in June 2002 to prioritize cross cutting constraints to biodiversity conservation and its sustainable use in the SADC region. The following criteria were used to prioritize regional constraints:

- The ability of opportunities that emanate from the constraint to contribute towards social and economic development and poverty eradication;
- Their regional nature in terms of the number of Member States affected by them; and,
- The feasibility of implementing opportunities emerging from the constraints within a regional context. This criterion removes those constraints that, because of their nature, are better handled at national rather than at regional level. For example, decisions on the range of ecosystems that should be represented on the national protected areas and marine parks networks are largely based on country level realities than on regional and international requirements or norms.

1.5.3 Formulation of the Strategy

After identifying and prioritizing regional constraints, the Swaziland workshop proposed strategies to address them. The resultant draft Regional Biodiversity Strategy was presented at a Southern Africa Biodiversity Forum meeting held in Zambia in November 2002. This draft document went through a major restructuring and reorganization exercise between December 2004 and February 2005 in conformity with the refocused SADC BSP. The resultant draft was subjected to several reviews and consultations at national and regional levels. They included the following:

- A meeting of the Task Force of the SADC BSP's Regional Steering Committee in Swaziland in February 2005;
- An External Peer Review of the draft Strategy between February and April 2005. Some 16 technical, policy and institutional experts from government, non-governmental organizations, international NGOs, universities, the private sector and donor organizations reviewed the draft Regional Strategy;
- Country level consultations on the draft document were carried out between April and May 2005; and,

- A regional workshop to discuss and finalize the document was held in South Africa in June 2005

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ANNEX II: BIODIVERSITY SITUATION IN SOUTHERN AFRICA

In this Annex, the biodiversity situation in southern Africa is presented with emphasis on its status; threats to its conservation and sustainable use; and the region's response. An attempt is made to balance the analysis in such a way that it contains sufficient information to guide the Regional Biodiversity Strategy preparation process but is not too detailed to bog down the various target audience of the document that include policy makers, researchers, academics and the public. The assessment was, however, constrained by the lack of up to date and consistent statistics on biodiversity issues in the region.

2.1 Status of biodiversity in the SADC region

For purposes of assessing the status of biodiversity in southern Africa, the ecosystems and sector approaches were considered.

Southern Africa supports a wide range of ecosystems that can be categorized by different features. One way of recognizing ecosystems is based on biomes or different vegetation types. These include different forest types, grasslands, savannas, deserts and the unique fynbos found on the southern tip of Africa. Ecosystems can also be based on physical or geographical boundaries such as mountains, rivers and wetlands. An ecosystem is bound together by a unique set of ecological processes that shape ecological communities within it. The manipulation of these processes can be used to manage ecosystems. The ecosystems approach is therefore a strategy for the integrated management of land, water and biological resources for their conservation and sustainable use.

Despite its inability to capture synergies and contradictions across sectors, the sector approach was adopted in the biodiversity situation analysis and in developing the Regional Biodiversity Strategy. Reasons for this were that:

- Member States and indeed SADC itself are structured along sectoral lines. Consequently, policies and programmes that affect biodiversity in the region are formulated and implemented within a sector context. The sector approach therefore ensures that projects emerging from the Regional Strategy are implemented within existing institutional frameworks;
- The contribution of natural resources to the Gross Domestic Product (GDP) of SADC Member States is captured along sectoral lines;
- The sector approach entices and brings on board the biodiversity constituency that is largely divided on sectoral lines; and,
- The ecosystems approach, as it relates to biodiversity and general programming in the region, is still evolving. Furthermore, it still has to find an institutional home within the existing planning and implementation frameworks.

The key biodiversity sectors identified were forestry, wildlife, aquatic life and agriculture. These primary sectors of production contribute significantly to the socio-economic development of southern Africa as most countries still have relatively small manufacturing sectors. Despite their undoubted importance as providers of ecological

services, microorganisms as well as fungi and small non-charismatic invertebrates are not included in the analysis. This is largely because the region has no adequate human, institutional and financial capabilities to handle them at this stage (Timberlake, personal com).

This section highlights the role of the four sectors in the economies of SADC Member States and their biodiversity status.

2.1.1 Forest biodiversity

a) Role of forest biodiversity

Closed forests consist of trees, the crowns of which limit sunlight penetration to the ground and discourage ground undergrowth. Open woodlands, on the other hand, comprise trees and grasses that grow together. The proportions of the two components vary with rainfall, soil type and other physical factors. In this document, forests are considered to have a canopy cover of above 80% while woodlands have a canopy cover of between 10% and 80% (ADB/EU/FAO, 2003).

The forestry sector contributes less than 3% to the GDP of most countries in southern Africa. The contribution largely comes from exotic timber plantations and commercial indigenous timber. However, the figure grossly misrepresents the contribution of forests and woodlands to the region's economy as the bulk of their products and services are not captured in national level statistics. For example, the World Bank estimates that forest based products such as wild foods, wood, medicinal plants, grass, reeds, honey and leaves contribute over 35% of average rural incomes in some parts of Zimbabwe. Furthermore, about 20% of the daily needs of some rural communities come from forests and woodlands.

Important products and services derived from forests and woodlands include: industrial timber and timber products; fuel wood, non- timber forest products; and environmental services. The latter include the provision of clean water, climate regulation, soil and biodiversity conservation, watershed protection, carbon sequestration and nutrient recycling. Furthermore, forests and woodlands are important culturally, as sacred and burial sites. With respect to carbon sequestration, southern Africa's vast forest resources, especially in the miombo and similar woodlands, are significant sinks for carbon dioxide and thus have a potential role in alleviating and balancing emissions from industrialized countries. Unfortunately, it is predicted that Africa will suffer the most, as its economies are more sensitive to climate change. The foregoing underscores the need to maintain as much forest cover as possible, recognizing other economic activities that compete with forestry.

b) Status of forest biodiversity

According to SARDC/IUCN/SADC (in press), forest and woodland types of southern Africa can be summarized as follows:

i) *Tropical forests*. These are found in parts of Angola and the Congo basin. They harbour a diverse assemblage of plants and animals with about 400 mammal species, more than 1 000 bird species and over 10 000 plant species of which some 3 000 are endemic to the region.

ii) *Afromontane forests*. They are found in the high altitude and high rainfall areas of Malawi, Mozambique, Tanzania, Zambia, Zimbabwe and South Africa. The tree species, that include *Podocarpus*, are similar to those found in tropical rainforests. However, one of the few differences with the latter is the occurrence of tree ferns and conifers.

iii) *Mangrove forests*. These are found along the coastline of Mozambique and Angola and the north east coast of South Africa. Tanzania, Namibia and Mauritius also have some Mangrove forests. These forests play a very important protective function to the coastline and are also key ecosystems for the breeding of marine fisheries.

iv) *Zambezi teak forests*. They are sometimes called the “Kalahari forests”. They occur in parts of Zimbabwe, Zambia, Botswana, Namibia and Angola. The dominant tree species is *Baikaea plurijuga*. This forest type has a long history of management for commercial timber exploitation, wildlife utilization, cattle grazing and water catchment.

v) *Miombo woodlands*. They are the most extensive woody vegetation type in areas north of the Limpopo river. Dominant tree species are *Brachystegia*, *Julbernardia* and *Isobertia*. Thickets of miombo hold little merchantable timber using current technologies and market preferences. Some of the woodlands, especially in Zimbabwe, Malawi and Tanzania, have been converted into intensive agricultural areas hence it is difficult to locate pristine woodlands in these countries.

vi) *Mopane woodlands*. They are found in the drier and lower lying parts of Zimbabwe, Zambia, Namibia, Angola, Botswana, South Africa, Mozambique and Malawi. Where *Colophospermum mopane* is dominant, the woodland assumes economic importance especially as a source of browse for both domestic and wild animals. In addition, the tree’s coppicing abilities render the woodlands economically important for subsistence wood fuel, construction poles and mopane worms.

Forests and woodlands of the SADC region cover some 39% of the total land area. This ranges from 0.5% in Lesotho to 56% in Angola. Between 1990 and 2000, the region’s indigenous forests were being lost at an average rate of 0.6% per annum. The figure ranged from 0.1% in South Africa to 2.2% in Malawi. On the other hand, Swaziland recorded a growth in forest cover of 1.3% over the same period partly due to extensive exotic timber plantations that the country has established (Table 2.1).

At the species level, there has been a marked decrease in the abundance of certain plants due to various human induced pressures. For example, the over- reliance on traditional medicinal plants for primary health care by the majority of the region’s citizens has contributed to the over -exploitation of species such as *Walburgia salutaris* in Swaziland

and Zimbabwe; and *Albizia brevifolia* in Namibia. Similarly, the commercialization of crafts like baskets and wood curios has led to a decline in tree species such as *Berchemia discolor* which is used as a palm leaf fibre dye in Botswana and Namibia. There has also been over- harvesting of *Azelia quanzensis* and *Pterocarpus angolensis* in a number of countries in response to the flourishing woodcraft industry. The proportion of threatened plant species in the region ranges from 0.5% in Angola to 40% in Swaziland (Prescott-Allen, 2001). Member States have established national seed banks, botanic gardens, museums, herbaria and zoological gardens for the *ex situ* conservation of selected forest genetic resources in response to the foregoing threats.

Table 2.1 Forest cover loss in southern Africa: 1990-2000

Country	Forest cover in 1990 (000ha)	Forest cover in 2000 (000ha)	Annual change (%)
Angola	70 998	69 756	-0.2
Botswana	13 611	12 427	-0.9
DRC	140 531	135 207	-0.4
Lesotho	14	14	NS
Malawi	3 269	2 562	-2.2
Mozambique	31 238	30 601	-0.2
Namibia	8 774	8 040	-0.8
South Africa	8 997	8 917	-0.1
Swaziland	464	522	+1.3
Tanzania	39 724	38 811	-0.2
Zambia	39 755	31 246	-2.1
Zimbabwe	22 239	19 040	-1.4
Total	379 614	357 143	-0.6

Source: FAO (2001).

Of the total forested area in the region, 2.5 million ha or 0.7% is under exotic timber plantations. South Africa has the largest area of exotic plantations, followed by Swaziland, Zimbabwe, Tanzania, Angola and Malawi in that order. Plantations have been established to reduce pressure on natural/indigenous forests for various products and services. However, because of their fast growth rates, exotic timber species such as eucalypts, pines and wattles take up more water than indigenous tree species. This disrupts microclimates and hydrological cycles of the affected areas and downstream. Consequently, the issue of their high use of scarce water resources will continue to dominate future debates on whether or not to expand exotic timber plantations in southern Africa. Furthermore, some of the exotic timber species have become invasive and are adversely impacting on indigenous vegetation and other biodiversity in ways that are only now starting to become clear. This is expected to drastically increase in severity under climate change (Masters *et al*, 2004).

There is a growing importance of “trees outside forests” in southern Africa. The trees are established on homesteads, in mixed agricultural systems and on degraded communal lands. Apart from enhancing the forest resource base, the trees increase biodiversity as they consist of both indigenous and exotic species. Tree planting has been quite successful in a number of SADC Member States and in other parts of the continent. In fact, the winning of the 2004 Nobel Peace Prize by a Kenyan national was in recognition of tree planting and “Re- greening efforts” taking place in Kenya in particular and Africa in general. However, a major constraint to tree planting in southern Africa has been low tree survival rates caused by inadequate moisture; ecological factors such as the absence of mycorrhizal fungi; termite and livestock damage; and insecure land tenure arrangements in the case of communal land.

2.1.2 Terrestrial wildlife biodiversity

a) Role of terrestrial wildlife biodiversity

Wildlife consists of living terrestrial organisms that occur naturally in the wild. However, this section focuses on large mammals because of their economic importance. Wild plants are covered under forest biodiversity. Large wild mammals are a unique economic resource in the sense that they make better use of vegetation compared to livestock and have many marketable uses in addition to meat production (SARDC/IUCN/SADC, in press). They are also used for both consumptive and non-consumptive tourism purposes.

Wildlife based tourism brings millions of dollars in foreign currency into the SADC region. In fact, this activity ranks among the top three contributors to the GDP of most countries of southern Africa. For example, tourism based receipts were US\$4 625 million, US\$4 717 million and US\$4 989 million in 1997, 1998 and 1999 respectively (SADC, 2001). The major activities include game and trophy hunting; and game viewing. In addition, local communities hunt wildlife mainly for subsistence requirements.

b) Status of terrestrial wildlife biodiversity

The region’s terrestrial wildlife resources are varied and abundant. They consist of hundreds or thousands of species of birds, plants, mammals, reptiles, butterflies, amphibians and invertebrates. The concentration of large mammal species is spectacular. For example, southern Africa supports between 200 000 to 250 000 elephants. Leopard, buffalo, kudu, zebra and other antelopes also occur in large numbers (SARDC/IUCN/SADC, in press). On the other hand, although cheetah and rhino are present in small numbers, the region has a high proportion of the world’s population of both species.

Notwithstanding the foregoing, terrestrial wildlife resources of the region are under tremendous pressure from a variety of sources that include habitat loss and poaching. There has, therefore, been a general decrease in the populations of most economically important large mammal species such as rhino, buffalo, antelope and lion. On the other hand, populations of a few species such as elephants have increased or stabilized,

possibly in partial response to trade restrictions imposed by the Convention on International Trade in Endangered Species (CITES) and the manipulation of water points in protected areas (Kojwang, personal com).

The proportion of threatened wild mammal species in the region ranges from 2.6% in Zimbabwe to 13% in South Africa (Prescott-Allen, 2001). However, the figures are on the increase in SADC as a whole (SARDC/IUCN/SADC in press). In terms of species extinction, the blue antelope and the quagga are the only mammalian species known to have become extinct in southern Africa in recent times (Groombridge, 1993; Monadjem, personal com). On the other hand, species such as the white and black rhino, black wildebeest, crowned crane, velvet gecko and the cape mountain zebra have come critically close to disappearing altogether, but decisive conservation action is allowing their populations to revive. African wild dogs are also endangered in the region, surviving only in large protected areas (Ledger, 1990). Similarly, the bearded vulture has undergone serious population declines and is now restricted to the Drakensberg range of South Africa and Lesotho. Although this species has several important relict populations in Ethiopia, the European Alps and Pyrenees of Spain and France, all the populations are in decline hence the need to secure the survival of the species in the SADC region (Barnard personal. com.).

2.1.3 Aquatic life biodiversity

This section largely focuses on fish, as there is limited information on other freshwater species in the region.

2.1.3.1 Freshwater fish biodiversity

a) Role of freshwater fish biodiversity

About 13% of the SADC region, excluding South Africa, consists of freshwater ecosystems called wetlands (SARDC/IUCN/SADC, 1994). The wetlands have rich aquatic species diversity that is widely distributed and contains rare species. They are among the most biologically productive ecosystems in southern Africa and provide important seasonal habitats for migratory bird species. According to SARDC/IUCN/SADC (1994), freshwater wetlands can be divided into:

- Lakes that are deep or shallow;
- Rivers, including floodplains;
- Dams that convert stretches of a river into artificial lakes; and
- Palustrine areas (swamps, marshes, ferns, bogs and dambos).

Freshwater fish are an integral part of wetland ecosystems. They are exploited for subsistence and commercial purposes and significantly contribute to the socio-economic development of the region. At the community level, they provide protein; food security; and employment. Fish catches vary from place to place. However, the best yields are associated with major lakes and dams. According to Table 2.2, the region's fish harvest increased from 398 065 tonnes in 1984 to 469 316 tonnes in 1993.

Table 2.2 Trends in freshwater fish harvests in SADC countries (in tonnes)

Country	1984	1993
Angola	7 500	7 000
Botswana	1 500	2 000
Lesotho	13	35
Malawi	65 064	65 000
Mozambique	4 000	4 689
Namibia	400	1 000
South Africa	1 150	2 375
Swaziland	90	110
Tanzania	237 318	300 000
Zambia	64 621	65 307
Zimbabwe	16 409	21 800
Total	398 065	469 316

Source: FAO Yearbook (1995).

b) Status of freshwater fish biodiversity

Some of the freshwater ecosystems of southern Africa such as Lakes Malawi and Tanganyika are rich in endemic and rare fish species. For example, the Rift valley lakes have large numbers of unique species of fish and a few plants because they are isolated from other freshwater systems. The deepest, Lake Tanganyika, has 1 300 species of fish and plants of which over 500 are found nowhere else. They include 230 species of fish. Lake Malawi has 500 species of fish and 95% are endemic (UNEP, 2002).

Fish species diversity and populations in some of the major water bodies of southern Africa are on the decline. Reasons for this include over-fishing, water pollution, drying out of water bodies and the introduction of Invasive Alien Species. The latter include fish and plants as elaborated below:

- Some fish species have been introduced to lakes and dams to produce larger catches. The “Lake Tanganyika sardine” (Kapenta) was brought into Lake Kariba and now provides the majority of the fish catch on that lake. However, such introductions have created problems in some cases. For example, the Nile perch that was introduced into Lake Victoria is a voracious predator that has driven some 200 species to extinction and many others to dangerously low levels (SARDC/IUCN/SADC, 1994). Although similar results have yet to be recorded in southern Africa, high risks exist on Lakes Malawi and Kariba; and,
- The invasion of some of the region’s water bodies by the water hyacinth has modified fish habitats as the weed modifies and degrades aquatic water systems, outgrows local water plants and takes over. When massive quantities of the plant die, they sink to the bottom and their decomposition deoxygenates the water resulting in the death of fish. Furthermore, the weed’s dominant cover absorbs

sunlight thereby seriously affecting the biodiversity of fauna and flora beneath the water level. The water hyacinth is a major problem in Malawi, South Africa, Tanzania, Zambia and Zimbabwe. Other important water weeds in the region include *Salvinia molesta*, *Pistia stratiotes* and *Azolla filiculoides*.

2.1.3.2 Marine biodiversity

a) Role of marine biodiversity

Coastal and marine ecosystems are part of the land most affected by its proximity to the sea and that part of the ocean most affected by its proximity to the land (Hinrichsen, 1998). Seven SADC Member States have coastal and marine ecosystems (Table 2.3). About 17% of the total coastline of Sub-Saharan Africa is in southern Africa and 27% of this is in South Africa. With the exception of Namibia, coastal countries have over 20% of their total population living within 100 kilometers of the coastline. This shows the level of population pressure on coastal resources and their significance to local and national economies as sources of protein (fisheries), minerals (e.g. diamonds and oils) and tourism. They are also a significant source of employment.

Fish exports from the region generate about US\$892 million per year (FAO, 2002). At least 200 000 people are directly employed in fisheries while over one million are dependant on related activities. The bulk of the fish is caught in Angola, Namibia and South Africa. Between 1971 and 2001, the three countries accounted for 90% to 97% of the coastal and marine fish catches in the region. The industry is predominantly industrial in these countries. On the other hand, artisanal and recreational fisheries are common on the east coast where they are valuable, both socially and economically.

Table 2.3 Basic coastal and marine statistics in SADC Member States

Country	Length of coastline (km)	Population within 100 km of coastline, % of total
Angola	1 650	29.4
DRC	160	na*
Mauritius	150	100.0
Mozambique	2700	59.0
Namibia	1 470	4.7
South Africa	2 880	38.9
Tanzania	1 425	21.1
Total	10 435	
Sub-Saharan Africa	63 124	

*na=not available

Source: World Resources Institute (2001) & National consultations.

b) Status of marine biodiversity

Coastal and marine resources in southern Africa are unique because they benefit from the diversity of two different oceans, the Atlantic and the Indian oceans. The coastline along the Atlantic ocean is characterized by long sandy beaches interspersed with rocky outcrops while that of the Indian ocean is rich in coral reefs and mangroves. Four quasi-distinct but interdependent marine ecological regions occur on the sub-continent. They are the Angolan Current, Agulhas bank, Mozambique Currents and Benguela systems.

The Angolan Current of southern Angola supports large concentrations of fish that include Cunene horse mackerel, Benguela hake, several tunas and two species of pilchard. On the other hand, fish species on the Benguela Current of southern Angola, Namibia and western South Africa include sardine or pilchard, round herring, pelagic goby, several mesopelagic mid-water species, Cape horse mackerel and two species of hake. The mackerels and hakes grow larger than the other species and become predatory on smaller fish. Other abundant predators include squids, some tunas, seabirds and the Cape fur seal. The coastal wetlands of Namibia, including three Ramsar sites, provide nursery areas for some fish and are important feeding grounds of palaeartic and resident shorebirds (Simmons, *et al*, 1991). It is also worth noting that there are numerous species of seabirds dependent on the Benguela Current, some of which are very critically endangered. In addition, over-harvesting in this Current has very detrimental impacts on ecosystem structure and functioning, including the top trophic level (Barnard, personal com.).

The Agulhas bank, off southern South Africa, provides a warm and stable spawning environment and many fish species migrate to it for this purpose. On the other hand, the Mozambique Currents of the east coast and Indian Ocean Islands have a much greater diversity of life due to the existence of varied habitats that include extensive deltas, estuaries, mud flats, mangrove forests, sea grass beds and coral reefs. For example, the coastline from Somalia to eastern South Africa supports at least 11 000 species of plants and animals. They include mangrove forests, many species of fish, crabs, shrimps and shorebirds that migrate from Northern Europe.

The overall marine fish catch in southern Africa has fluctuated over the last three decades. However, there is less fish being caught now compared to the 1970s. For example, some 1.8 million to 1.9 million tonnes of fish were caught between 1972 and 1974; less than 1million tonnes from 1984 to 1986 and about 1.7 million tonnes in 2001. Reasons for this overall decline include: unsustainable harvesting methods and rates; pollution; loss of habitat; and climate change as highlighted below.

i) Unsustainable harvesting methods and rates. These include dynamite fishing; use of mosquito nets in the code end of trawling nets; trawling in the corals and grass beds; and poisoning. The issues range from activities of unlicensed foreign vessels to misreporting of catches by national vessels and the encroachment of industrial vessels into artisanal fishing zones.

ii) *Pollution*. Land-based pollution sources include discharge of sewage, industrial effluents, storm water runoff, wind-blown litter, suspended sediments and agro-chemicals. For example, 63 ocean outfalls along the coast of South Africa discharge about 800 000 cubic metres of sewage and industrial effluent into the sea every day (DEAT, 1999). The industrial effluents come from large fish processing plants, abattoirs, and chemical and manufacturing industries. For example, some 126 factories in and around Maputo in Mozambique have no waste treatment plants and their drains discharge toxic wastes, poisons, non-degradable substances and organic matter into the sea (Chenje, 2000). Similarly, oil spills at sea have caused major problems for the conservation of seabirds in South Africa. On the other hand, plastics kill many marine animals such as turtles that mistake them for jellyfish.

iii) *Habitat loss*. Coastal erosion is a growing problem that is exacerbated by the upstream construction of dams, the development of coastal infrastructure such as artificial lagoons and the clearing of mangroves. On the east coast, coral reefs and sea grass beds are being silted by excessive upstream erosion and sediment discharge. Once settled, the sediments clog the delicate filter feeding apparatus of corals and other reef feeding organisms. The mining of sand, corals, limestone and shells depletes the buffer zone provided by coral reefs and exposes shores to wave action, storm surges and inundation. For example, one million tonnes of coral sand are excavated by hand and transported by canoes in Mauritius every year (Bigot et al, 2000). Coastal erosion is primarily caused by uncoordinated and inappropriate developments in the coastal zone, high population growth and the rapid development of the tourism industry. The need for Environmental Impact Assessments before such initiatives are embarked upon can therefore not be over emphasized.

iv) *Climate change*. Long -term climate change may affect the distribution of marine resources. Increased air temperatures will cause marine animal breeding on land (e.g. African penguins) to be subjected to heat stress, which could reduce reproductive output, by causing animals to abandon their young. Increased temperatures could also alter the structure of some marine populations whose breeding is temperature dependent. An example is the changing ratios of hatchling turtles of different sexes that could be expected because of changed temperatures (Shackleton *et al*, 1996). Furthermore, oceanic currents, especially strong upwelling systems of which the Benguela Current is the world's strongest, could be vulnerable to climate change. Oceanographic changes, such as melting of the Antarctic ice shelves and lowering of regional salinity, could have significant impacts on the strength of the upwelling. Should this happen, the entire climate of southern Africa could be thrown into increasing disarray and variability, with drastically reduced rainfall (Barnard, personal com). Consequently, climate change may have serious implications for terrestrial, freshwater and marine ecosystems. The region should therefore better understand these issues and appropriately plan adaptation responses.

Given the foregoing threats, a number of coastal biota has become vulnerable (e.g. whale shark), endangered (e.g. green sawfish) or critically endangered (e.g. common sawfish). Such developments, coupled with reduced catches and decreases in the mean size of

caught fish, have led to calls for the protection of fish stocks by governments in the region. Fishery management measures introduced include minimum size limits, bag limits, closed seasons and closed areas (marine parks). However, such controls have not always been easy to monitor and enforce.

Marine parks or marine protected areas have been established to limit the harvesting of marine and coastal resources. Southern Africa has about 50 parks along its coast. They are mostly under the jurisdiction of governments and include the Mafia Island park in Tanzania, the Agulhas and Cape Peninsula parks in South Africa and Kissama and Lona national parks in Angola. In situations where marine parks have been formally established and regulated (e.g. in some parts of South Africa), inshore fisheries have successfully recovered (Msiska, *et al*, 2000). Between 2001 and 2004, Mozambique proclaimed three marine parks, the influences of which will be positive, if fully supported.

2.1.4 Agro-biodiversity

a) Role of agro-biodiversity

Agriculture is the major land use in the SADC region. It contributes 35% to the GDP and about 66% of the region's citizens depend on it for food, income and employment. In addition, the sector is the major source of exports in many countries and contributes about 13% to total export earnings and 66% to the value of intra-regional trade. For these reasons, the performance of agriculture has a strong bearing on the rate of economic growth, the level of employment, demand for other goods, economic stability, food security and overall poverty eradication in the region (RISDP, 2004). However, national and household food security in southern Africa is threatened by recurrent droughts. During periods of food insecurity, the region's population, especially the poor, turn to natural resources for survival. This contributes to their over-exploitation and loss of biodiversity.

b) Status of agro-biodiversity.

Agro-ecosystems occur where naturally occurring plants and animals have been replaced by crops and livestock deliberately selected by human beings. The degree of disruption of natural systems varies with the type of agriculture practiced. About 25% of the total land area of southern Africa of about 9.3 million sq. km. is arable (SADC, 2000). The region is very rich in domesticated plant and animal genetic resources. Because of its tropical location, and variations in altitude, rainfall, and evapotranspiration, southern Africa can produce agricultural products found in most parts of the world. They include tobacco, maize, mangoes, bananas, sugarcane and coffee for tropical climates; citrus fruits (e.g. oranges and lemons) and sheep for mediterranean climates; and deciduous fruit (peaches and apples) for temperate climates. In addition, a wide range of crops associated with subsistence farming such as small grain cereals, groundnuts, beans, cowpeas, sweet potatoes, bambaranut and indigenous vegetables are grown. The latter include *Amaranthus hybridus*, *Bidens pilosa* and *Cucurbita spp.*

Both large and small- scale agriculture are widely practiced in southern Africa. However, the value of the latter, which has hitherto been largely for subsistence, is rarely reflected in national accounts. Subsistence agriculture is based on the production of food crops. Notwithstanding, there is a growing trend towards export agriculture even on smallholder farms. This has been through the production of cash crops such as cotton, tobacco, tea, coffee, sugar and wheat. However, maize, a staple food for the majority of the region's population, is still the major crop and is widely grown. Cassava is dominant in some lakeshore districts of Malawi, Tanzania and coastal Mozambique (Chenje, 2000). With recurring droughts, the cultivation of the crop is on the increase as it is more tolerant to dry spells than maize. In Mauritius, sugarcane is the dominant crop (SADC, 2001).

Agro-forestry, which refers to the integration of trees into agricultural systems, offers opportunities for enhancing the diversity of existing cropping enterprises in addition to enhancing soil fertility, soil water holding capacity and livestock feed; and reducing soil erosion. Potential agro-forestry interventions include the introduction of hedgerow intercropping and alley cropping with tree species such as *Leucaena*, *Glyricidia* and *Sesbania sesban*. Apart from enhancing crop diversity, such tree species increase the profitability of smallholder farming systems through activities such as smallholder dairy farming. Farmers in a number of SADC Member States have successfully adopted the latter. Trees provide fodder to dairy cows in such systems.

With the commercialization of crop production in the region, there is some gradual erosion of traditional crop varieties in favour of improved cultivars that give higher yields and better economic returns. This is forcing smallholder farmers to rely on external seed sources that are usually expensive and not readily available. Furthermore, it is narrowing the genetic base of important food crops and leading to the disappearance of land races and the traditional knowledge associated with them. Such knowledge has been transmitted from generation to generation. It has, and continues to play an important role in vital areas such as food security and agricultural development. On the other hand, in drier areas, where intensification is not feasible, extensive agriculture is leading to the loss of wild crop landraces. Consequently, considerable effort has gone into the *ex situ* conservation of traditional crop germplasm at both the national and regional levels through seed banks. The latter level includes the SADC Plant Genetic Resources Centre located in Zambia.

Livestock farming is another important land use system in the region. Given that about 70% of southern Africa is semi-arid to arid, extensive livestock and wildlife production systems are the most suitable and potentially sustainable forms of land use. Furthermore, livestock is an important cultural and economic resource and sustains livelihoods of the majority of the region's citizens. The common livestock species kept include cattle, goats, sheep, donkeys and chickens. However, the overall number of livestock has fluctuated over the last three decades due to drought and diseases such as foot and mouth and anthrax (SARDC/IUCN/SADC, in press). This is partly because livestock production in the region is still highly dependant on traditional subsistence systems that are very vulnerable to climatic changes and disease out-breaks. The threat of livestock diseases

has led some Member States to adopt a cautious approach towards “breaking down” border fences in pursuit of trans-boundary cooperation. The control and containment of livestock diseases has, in the past, relied heavily on game fences and the control of wild and domestic animal movements and translocations.

The prospect of removing barriers to wildlife and livestock movement as perceived under Trans-boundary Natural Resources Management (TBNRM) initiatives has major implications for animal health and disease control strategies in the SADC region. Some of the animal health issues presently of greatest concern in the Greater Limpopo Trans-frontier Conservation Area (TFCA), for example, are (Cumming & WCS AHEAD, 2004):

- The breakdown of controls for foot and mouth disease in Zimbabwe and its spread within the southeastern sector of the country;
- The possible re-invasion of tsetse fly and trypanosomiasis. Apart from information on the control of tsetse fly during the 1970s, and some recent information on its spread, little published information appears to be available on animal health and diseases in the Mozambique sector of the TFCA. There is also evidence of a return of tsetse fly to the Save-Rundi junction area of the Gonarezhou National Park in Zimbabwe; and,
- The northward spread of bovine tuberculosis in the Kruger National Park in South Africa, for which there is published documentation. The possible entry of the disease into Zimbabwe and its status in Mozambique are of great concern.

Another disturbing trend within the livestock sector has been the discard of well-adapted indigenous livestock breeds in favour of the more productive exotic breeds under both large scale and smallholder farming systems. This is leading to the loss of genetic materials that are critical for the long- term development of livestock in southern Africa. According to a recent FAO World Watch List on threatened domestic animal breeds, over half of the domestic animal breeds will be extinct in the next 20 years unless adequate action is taken. With them will die the genetic resources they have developed to survive extreme environments and diseases. Such resources may be vital for feeding and clothing future generations in both developed and developing countries. Apart from the loss of germplasm, there is also the loss of traditional knowledge on livestock management that has been handed down from generation to generation as demonstrated in Table 2.4.

Table 2.4 Traditional remedies for the treatment of some of the commonly encountered disease conditions in farm animals in Zimbabwe

Animal condition	Remedy	Method of application
Eye problems	<i>Solanum indicum</i>	Fruit is crushed and the fluid applied to the eye.
Coccidiosis	<i>Aloe spp</i>	Grind fresh leaves and add to drinking water.
Bloat	<i>Pauzzozia mixta</i>	Leaves crushed and water added; animal made to

Newcastle disease	<i>Sesamum angustifolius</i>	swallow mixture. Crush fresh fruit and add to drinking water for poultry.
Fertility	<i>Loranthus spp</i>	Feeding fresh leaves to rabbits improves kidding rate.
Poor milk flow	<i>Adansonia digitata</i>	Inner core of dried fruit is removed, added to water; animal made to swallow mixture.

Source: Matekaire, *et al* (2004)

2.2 Threats to biodiversity in the SADC region

The SADC region is experiencing human induced erosion of its genetic resources. The trend continues unabated as human activities (e.g. agriculture, exotic timber plantations, mining and urban development) transform habitats and replace indigenous biota. The loss of genetic resources results in the loss of ecosystem goods and services and translates into missed economic opportunities for present and future generations.

Threats to biodiversity in southern Africa include population growth and poverty, agricultural expansion, continued reliance on wood fuel, land degradation, and the introduction of genetically modified organisms and proliferation of invasive alien species. These threats cut across the four-biodiversity sectors elaborated in the previous section (viz. forestry, wildlife, aquatic life and agriculture) and are highlighted below.

2.2.1 Population growth and poverty

The population of southern Africa was approximately 193 million people in 2000 (World Bank, 2002). Despite the adverse impacts of the HIV/AIDS pandemic, the region's population is growing at an average rate of 2.3% per annum; ranging from 1.4% in Zimbabwe to 3.3% in Angola (Table 2.5). One of the challenges facing the region is how to increase agricultural output in order to adequately feed the growing population. Given the limited availability of suitable agricultural land, there is increasing pressure to convert marginal lands to agriculture. This is contributing to deforestation, land degradation and loss of biodiversity.

Table 2.5 The human population of southern Africa: 2000.

Country	Population in 2000 (million)	Annual rate of change: 1995-2000 (%)
Angola	12.7	3.3
Botswana	1.6	1.9
Lesotho	2.2	2.2
Malawi	11.0	2.5
Mozambique	17.3	2.4
Namibia	1.7	2.3
South Africa	42.9	1.5
Swaziland	1.0	2.9
Zambia	10.1	2.3
Zimbabwe	12.6	1.4
Total	113.1	2.3

Source: World Bank (2002) & National consultations.

Sub-Saharan Africa has been more seriously affected by HIV/AIDS than any other part of the world. The pandemic has surpassed malaria as the leading cause of death in the region. With an infection rate of about 20% of the entire adult population aged between 15 and 49 years, southern Africa has the largest infected population in the world. The extent of the pandemic has affected virtually every aspect of the lives of people in the SADC region and has now reached crisis proportions (SADC, 2004). The effects of HIV/AIDS include:

- Diverting the limited national and household resources to caring for the infected and the orphaned. This is contributing to reduced economic growth through reduced investment in the productive sectors; and,
- Reducing the agricultural workforce through deaths and spending more time caring for the sick. This has contributed to reduced agricultural production and productivity and increased food insecurity and poverty levels.

The foregoing developments place direct and indirect pressures on the region's biodiversity.

Between 40% and 85% of the region's population is rural and over 40% of its citizens live on less than US\$1 per day. The majority of the population is therefore poor and relies on natural resources and agriculture for survival. Poor people have little choice but to over-exploit the environment. This, in turn, worsens their poverty situation by reducing agricultural productivity and household food security. For example, urban agriculture and stream bank cultivation, which are some of the mechanisms used to cope with increasing poverty, are contributing to land degradation (SARDC/IUCN/SADC, in press).

The growing population is also putting considerable pressure on Non- Timber Forest Products (NTFPs) such as medicinal plants and indigenous fruits, which provide a range of products for subsistence and commercial purposes. For example, more people are relying on medicinal plants for their primary health care needs as modern drugs are becoming either unavailable or prohibitively expensive. This has led to the over-exploitation of certain plants with desirable medicinal properties. Table 2.6 gives some of the documented medicinal uses of selected indigenous plants. It demonstrates that the plants have a multitude of uses, the bulk of which remain unexplored and unexploited. For example, the Neem tree possesses 24 documented medicinal properties and has been used for such purposes for centuries. It has often been referred to as the “village pharmacy”.

Table 2.6 Medicinal uses of selected indigenous plants.

Scientific name	Common name	Medicinal uses
<i>Annona senegalensis</i>	Wild custard apple	Wound healing, chest, colds, diarrhoea & dysentery.
<i>Pterocarpus angolensis</i>	Mukwa, Kiaat	Treatment of skin problems such as sores & ring worms.
<i>Tamarindus indica</i>	Tamarind	Leprosy treatment, fevers, laxative, cardiac diseases & constipation.
<i>Trichilia emetica</i>	Natal mahogany	Parasitic skin infections and inflammations, anti-epileptic & bronchial inflammation.

Source: Adapted from Iwu, *et al* (1993); Ngozi, (1996); Chidumayo, (1994)

2.2.2 Agricultural expansion

Most of the economies of southern Africa are based on agriculture. About 66% of the population depends on agriculture for food, income and employment; and agricultural output strongly influences the region’s economic growth (Hirji *et al*, 2002). For example, 90% of Malawi’s population depends on tilling the land; in Mozambique, Swaziland and Tanzania over 80% of the population is dependent on agriculture; while in Angola, Botswana and Zimbabwe, the ratio is still above 70%. There is therefore, a huge demand for land for agricultural expansion in the region. This is partly because the majority of the population practices subsistence farming that is characterized by low productivity and food insecurity. Although shifting cultivation under long fallow cycles is sustainable and less damaging to the environment, short fallow shifting cultivation is not. The latter is the major cause of deforestation in countries like Zambia.

According to Table 2.7, the total land area under cropping in southern Africa increased from 394.8 million ha in 1994 to 396.7 million ha in 2001. The expansion of agricultural land has been caused by the need to feed growing populations and to grow cash crops for export. The situation is exacerbated by the low use of chemical fertilizers and the limited planting of improved seed stock, which lead to low crop yields (SARDC/IUCN/SADC, in press). Consequently, overall per capita food production in southern Africa has declined by 25% since 1980 (Cumming, 1999).

Table 2.7 Land under cropping in southern Africa between 1994 and 2001 (000ha)

Country	1994	2001
Angola	57 500	57 300
Botswana	26 000	25 973
DRC	22 900	22 880
Lesotho	2 329	2 334
Malawi	3 810	4 190
Mauritius	113	113
Mozambique	47 800	48 235
Namibia	38 750	38 820
South Africa	99 000	99 640
Swaziland	1 340	1 390
Tanzania	39 600	39 950
Zambia	35 273	35 280
Zimbabwe	20 370	20 550
Total	394 785	396 655

Source: FAOSTAT data (2004)

The impact of agriculture on the region's biodiversity in future will largely depend on the success of current efforts to modernize and intensify farming and to introduce and implement conducive land reforms. Countries such as Zimbabwe, South Africa, Zambia, Namibia and Botswana have embarked on land reforms.

2.2.3 Continued reliance on wood fuel

With the exception of South Africa and Mauritius, fuel wood is the primary source of energy in the countries of southern Africa. In 2000, total fuel wood consumption in the region was estimated at 159 million cubic metres. Some 41% of this amount was consumed in the Democratic Republic of Congo (Table 2.8).

Table 2.8 Estimated fuel wood consumption in southern Africa (000 m3)

Country	Consumption
Angola	3 740
Botswana	745
DRC	72 707
Lesotho	2 754
Malawi	6 131
Mozambique	31 278
Namibia	872
South Africa	2 183
Swaziland	947
Tanzania	20 787
Zambia	8 773
Zimbabwe	7 894
Total	158 811

Source: FAO (2001)

About 87% of the round wood produced in the region is used as fuel wood. The situation is likely to continue due to the following:

- Fuel wood is the most reliable, affordable and accessible source of energy especially for poor households. Studies have shown that other conventional energy sources like electricity, petroleum products and coal are not widely used because they are not affordable and/or readily accessible. In several countries, the consumption of fuel wood has increased due to increasing prices of petroleum products, electricity and electrical appliances. For example, the proportion of fuel wood used in Malawi's rural households has increased from 90% to 94% in recent years. Angola is the only oil producing country in southern Africa. However, the price of petroleum products in that country makes it impossible for the poor rural population to use such products (ADB, 2000);
- Under most communal area systems, fuel wood is not purchased but just collected by inhabitants of these areas. This "free resource" enables poor households to channel their incomes to other needs;
- In some countries, particularly those in which charcoal use is prevalent, trading in charcoal is a major source of income for some households. For example, in Zambia, the charcoal industry generates about US\$30 million annually and about 60 000 people directly depend on it for the bulk of their income (SARDC/IUCN/SADC, 1994); and,
- Economic reforms recently implemented in the region removed subsidies on energy alternatives. This has further increased the demand for fuel wood and other biomass.

Over reliance on fuel wood in the region has led to widespread deforestation, land degradation and loss of biodiversity. Unfortunately, the demand for this energy source is expected to double in the next 30 years (Chenje, 2000). Table 2.9 shows that although this trend is consistent with the situation in the rest of Africa, there are declines in aggregate wood fuel consumption in the other developing regions of the world except South America. The decreases are due to ready access to affordable and readily available alternatives and high household incomes in those regions. Higher income households tend to prefer cleaner and more convenient energy sources than wood (Arnold et al, 2003).

Table 2.9 FAO projections of wood fuel consumption in the world's developing regions (in million cubic metres)

Region	1970	1980	2000	2010	2020
S. Asia	234.5	286.6	359.9	372.5	361.5
S. E. Asia	294.6	263.1	178.0	139.1	107.5
E. Asia	293.4	311.4	224.3	186.3	155.4
Africa	261.1	305.1	440.0	485.7	526.0
S. America	88.6	92.0	100.2	107.1	114.9
World	1 444.7	1 572.7	1 616.2	1 591.3	1 558.3

Source: Broadhead et al, 2001

2.2.4 Land degradation

Human induced pressure on land resources is causing widespread environmental degradation in the region. In rural areas, the capacity to sustain economic activity is approaching its limits. The 'food production- population imbalance' in these areas is forcing production increases through opening up of new and often marginal land to farming as well as over-cultivation, overgrazing and deforestation (Chenje, 2000; Grainger, 1990).

About 70% of southern Africa is classified as arid or semi-arid. Consequently, the region's climate, which is characterized by low and erratic rainfall, leads to unsustainable land management, which in turn, contributes to flooding. For example, the United Nations Office for the Coordination of Humanitarian Affairs attributes the worsening flooding in southern Africa to land degradation caused by deforestation, overgrazing and soil erosion. It is therefore worth noting that modest investments by developed countries into environmentally sound ecosystems' management might save billions of dollars wasted on crisis management, famine, floods, drought, fire or mudslide relief.

Table 2.10 shows the severity of land degradation in southern Africa. According to the table, about 75% of the region's land surface is degraded. Of this figure, 60% is lightly to moderately degraded; while the remainder is severely to very severely degraded. As

expected, the more severely degraded areas are associated with high human and animal population densities. Land and soil disturbances associated with land degradation reduce soil water holding capacity, soil fertility and the population of beneficial microorganisms. This has adverse effects on agro-biodiversity and food security in the region.

Table 2.10 Severity of land degradation in southern Africa (as % of total land area)

Country	Total land area (000 sq km)	No land degradation	Light to moderate degradation	Severe to very severe degradation
Angola	1 247	61	26	13
Botswana	582	31	57	11
DRC	2 435	33	60	8
Lesotho	30	0	100?	0
Malawi	118	39	61	0
Mozambique	799	31	68	0
Namibia	824	57	21	23
South Africa	1 219	22	13	65
Swaziland	17	0	100	0
Tanzania	945	12	62	25
Zambia	753	7	65	17
Zimbabwe	390	7	92	0
Average		25	60	14

Source: SARDC/IUCNSADC (in press)

2.2.5 Introduction of Genetically Modified Organisms and proliferation of Invasive Alien Species

2.2.5.1 Introduction of Genetically Modified Organisms

Among the impacts of economic liberalization, the quest for high agricultural productivity and recurrent droughts in southern Africa has been an increase in the imports of Genetically Modified Organisms (GMOs), which are products of biotechnology. The latter refers to a suit of techniques employed in the manipulation of life forms to obtain useful products and services. GMOs have the capacity to boost the world's food supply in the face of increasing human populations, especially in developing countries. Within southern Africa, they have mostly come in the form of food aid and improved plant germplasm. However, if not properly handled, GMOs have the potential to adversely affect agro-biodiversity, human health and other biota as follows:

- Genetically modified grain imports might contaminate traditional and modern crop cultivars and reduce genetic diversity through cross-fertilization in situations where smallholder farmers recycle planting seed. This could signal an end to the hardy heritage seeds that have sustained traditional communities in southern Africa for centuries;

- Certain GM foods have the potential to adversely affect human health when consumed. Comprehensive safety studies are therefore required before such foods are availed for human consumption. More importantly, consumers should be given all relevant information on the GM food to enable them to make informed choices. Unfortunately, most of the SADC Member States have not yet developed national biosafety frameworks as enshrined in the Cartagena Protocol on Biosafety. In fact, only seven of the thirteen countries have ratified and/or acceded to the Protocol; and,
- They can potentially affect non- target species such as pollinators and herbivores.

2.2.5.2 Proliferation of Invasive Alien Species

Invasive Alien Species (IAS) are species introduced deliberately or unintentionally outside their natural habitats where they have the ability to establish themselves, invade, out-compete natives and take over the new environments (IUCN, 2000). Such species are found in all categories of living organisms and all types of ecosystems. IAS were mostly introduced into the SADC region for their economic and aesthetic values such as commercial timber, cropping, biological control agents and ornamental functions. However, some of them have significant environmental and economic impacts at genetic, species and ecosystems levels as follows:

- At genetic level, IAS reduce genetic diversity through the loss of genetically distinct populations; the loss of genes and genetic complexes and hybridization of introduced species with native ones (Boudouresque *et al*, 1995);
- At the species and community levels, IAS compete with native biota; replace them; predate them; parasitize on them; cause diseases; and reduce their growth and survival rates. In its compilation of the Red Data List of threatened species, IUCN cited IAS as directly affecting 30% of all threatened birds, 15% of all threatened plants and 10% of all threatened mammals (Carlton, 1998);
- At the ecosystem level, IAS disturb nutrient recycling, pollination and the regeneration of soils and energy, among other things. Apart from reducing biodiversity, IAS threaten the integrity of natural systems. For example, the “fixing” or sequestration of carbon is becoming a major consideration regarding global warming. In some parts of southern Africa, fire prone IAS have replaced indigenous vegetation and may accelerate the release of carbon.

The globalization of markets and increases in global trade, travel and tourism are conveying more species from and to all parts of the world. This has enhanced chances of bio-invasions across ecosystems with economic costs to agriculture, forestry, fisheries and other economic sectors as well as on human health and general welfare. Some of these costs include direct costs of prevention, control and mitigation as shown by the following examples:

- The cost to restore the South African *fynbos* due to invasions by *Pinus*, *Hakea* and *Acacia* species is about US\$169 million (Turpie *et al*, 2000);
- The Cypress aphid killed *Cupressus* trees worth US\$41 million in eight countries of eastern and southern Africa between 1986 and 1991 (Murphy, 1997); and,

- Costs associated with the water hyacinth problem in seven African countries is US\$71.4 million per year (Kasulo, 2000)

With respect to the water hyacinth, it can interfere with hydroelectric power generation schemes and block water intake points. In Lake Chivero (which supplies drinking water to the City of Harare in Zimbabwe), the weed is causing serious water quality problems. Its presence in high organic matter form results in difficulties in water treatment and leads to the siltation of water bodies. Infact, IAS are the single greatest threat to aquatic ecosystems in southern Africa.

2.3 Responses to biodiversity threats in the SADC region

The foregoing threats to biodiversity greatly undermine SADC's ability to achieve its economic and social development goals. Consequently, the region, with support from its development partners, has responded to some of the challenges through a number of initiatives. They include: developing a SADC Regional Indicative Strategic Development Plan; formulating regional instruments; signing and ratifying international conventions; establishing protected areas; implementing Community Based Natural Resource Management projects; implementing Trans- boundary Natural Resources Management programmes; and carrying out biodiversity related projects and programmes. The initiatives are highlighted in this section.

2.3.1 Development of a SADC Regional Indicative Strategic Development Plan

The SADC Regional Indicative Strategic Development Plan (RISDP) of 2004 is the vehicle for achieving the region's goals of social and economic development and poverty eradication. The Plan recognizes the importance of agriculture and other natural resources in the attainment of these goals. Box 2.1 highlights the areas of focus for the Plan's policy interventions for "Sustainable Food Security" and "Environment and Sustainable Development".

Box 2.1 Areas of focus for the RISDP's policy interventions for "Sustainable food security" and "Environment and sustainable development" (SADC, 2004).

- ✓ Improving food availability and promoting the sustainable use of natural resources;
- ✓ Improving forecasting, prevention, mitigation and recovery from adverse effects of natural disasters;
- ✓ Creating the requisite harmonized policy environment, as well as legal and regulatory frameworks to promote regional cooperation on all issues relating to environment and natural resource management, including trans-boundary ecosystems;
- ✓ Promoting environmental mainstreaming in order to ensure the responsiveness of all SADC policies, strategies and programmes to sustainable development;
- ✓ Conducting regular assessments, monitoring and reporting on environmental conditions and trends in the region;
- ✓ Building capacity, sharing information and creating awareness on problems and

- | |
|---|
| <p>perspectives in environmental management; and,</p> <p>✓ Ensuring coordinated regional positions in the negotiation and implementation of Multilateral Environmental Agreements and other agreements.</p> |
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Specific short, medium and long- term plans are being formulated to operationalise focal areas of the RISDP. The Regional Biodiversity Strategy is part of such efforts.

2.3.2 Formulation of regional instruments

In line with SADC's drive towards regional cooperation in natural resource management, its Member States have signed and/or ratified a number of biodiversity related protocols. The protocols provide legally binding frameworks for regional collaboration among Member States and demonstrate the region's political and technical will to mainstream the environment (including biodiversity) into its development strategies. The protocols include:

- The Protocol on Shared Watercourse Systems;
- The Protocol on Trade;
- The Protocol on Education and Training;
- The Protocol on Culture, Information and Sport;
- The Protocol on Energy;
- The Protocol on Mining;
- The Protocol on the Development of Tourism;
- The Protocol on Health;
- The Protocol on Wildlife Conservation and Law Enforcement;
- The Fisheries Protocol; and,
- The Forest Protocol.

The foregoing protocols contain elements of biodiversity and are at various stages of implementation. However, most of them have not yet been fully integrated into national policies and laws (IUCN, 2003).

It should, however, be noted that despite its cross cutting nature, there is no stand-alone regional protocol on biodiversity. Such a protocol would enhance SADC's commitment to biodiversity conservation and its sustainable use. Furthermore, the protocol would demonstrate the cross cutting nature of biodiversity through cross-references to other protocols. It would therefore represent an important step forward in the integrated and comprehensive management of biodiversity as a basis for sound natural resource management in southern Africa.

2.3.3 Signing and ratification of international instruments

SADC Member States have signed, and/or ratified and acceded to a number of international instruments related to biodiversity. They include:

- The UN Convention on Biological Diversity;
- The Cartagena Protocol on Biosafety;
- The World Trade Organization;
- The FAO International Treaty on Plant Genetic Resources for Food and Agriculture;
- The Ramsar Convention on Wetlands;
- The International Union for the Protection of New Varieties of Plants;
- The UN Convention to Combat Desertification;
- The UN Convention on the Law of the Sea;
- The World Intellectual Property Organization;
- The UN Framework Convention on Climate Change; and,
- The Kyoto Protocol.

The foregoing international instruments recognize that sustainable natural resource management is essential for poverty reduction and lasting improvement of rural livelihoods in southern Africa. However, with the exception of the CBD, the United Nations Convention to Combat Desertification and the World Intellectual Property Organization that have been ratified by all Member States, some countries have yet to do so with the other international instruments (Table 2.11). In addition, Member States are at different stages of implementing provisions of the instruments. Notwithstanding, a number of regional programmes and projects related to some of the instruments are being implemented. It is however interesting to note that although the thrust of most of the instruments is similar, there is little to no coordination in their implementation at both national and regional levels. This has resulted in the duplication of efforts and inefficient use of scarce human and financial resources in some cases.

Table 2.11 Status of Member States regarding international instruments

Country	CBD	Cartagena	ITPGRFA	Ramsar	CCD	Kyoto	WIPO
Angola	r	-	S	-	r	-	m
Botswana	r	r	-	r	r	a	m
Lesotho	r	a	-	r	r	a	m
Malawi	r	-	r	r	r	a	m
Mozambique	r	r	-	s	r	r	m
Namibia	r	-	s	r	r	a	m
S. Africa	r	a	-	r	r	a	m
Swaziland	r	-	s	-	r	-	m
Zambia	r	a	s	r	r	s	m
Zimbabwe	r	-	s	-	r	-	m
DRC	r	-	a	r	r	r	m
Mauritius	r	a	s	r	r	r	m
Tanzania	r	a	s	r	r	r	m

Key: r = ratified; s = signed; a = acceded; m = member

2.3.4 Establishment of Protected Areas.

SADC Member States have set aside about 15% of their total land area as protected areas consisting of gazetted forests and national parks. The land coverage of protected areas ranges from 3.4% in Angola to 30.4% in Zambia (Table 2.12). The areas are managed for environmental protection, conservation of biodiversity, water catchment functions, wildlife reservoirs, commercial exploitation of indigenous timber, and for aesthetic values.

Protected areas have had the following impacts:

- These vast areas and their rich forest and wildlife biodiversity have facilitated the development of a booming tourism industry in southern Africa. Tourism has become the third largest contributor to the region's GDP after agriculture and mining;
- They provide habitats for endangered species of flora and fauna. For example, the bulk of "important bird areas" for threatened or endangered bird species such as the crowned crane and bearded vulture are found in protected areas;
- Because of their rich biodiversity, protected areas play a key role in the *in situ* conservation of a wide range of genetic resources. However, it has been argued that the existing protected areas network does not adequately represent the full range of natural ecosystems in most countries of southern Africa; and,
- Over 70% of the protected areas lie across international boundaries. They therefore provide opportunities for Trans-boundary Natural Resource Management initiatives within the region.

Table 2.12 Extent of protected areas in southern Africa.

Country	Area (000 ha)	% of total land area
Angola	8 220	3.4
Botswana	10 499	18.5
DRC	14 637	6.4
Lesotho	680	22.4
Malawi	1 058	11.2
Mozambique	12 875	16.1
Namibia	11 216	13.6
South Africa	7 314	6.0
Swaziland	76	4.3
Tanzania	26 262	30.0
Zambia	22 650	30.4
Zimbabwe	5 850	15.0
Total/Average	121 298	14.8

Source: United Nations (2003) & National consultations.

Existing legislation in southern Africa precludes neighbouring communities from accessing goods and services from protected areas. This has created 'islands of green' surrounded by degraded communally owned landscapes. The net result has been increased poaching, illegal settlements and loss of biodiversity in some protected areas. Community participation and the development of appropriate Access and Benefit Sharing arrangements are therefore critical for the sustainable management of protected areas. The Communal Areas Management Programme for Indigenous Resources in Zimbabwe presents a major participatory approach for communities that neighbour national parks areas. However, the approach has yet to find wide application for other natural resources such as commercial timber and veld products (Machena *et al*, 2005).

2.3.5 Implementation of Community Based Natural Resource Management Initiatives.

For more than two decades, some countries in southern Africa have been implementing strategies that support human livelihoods through the sustainable use of biological resources within the context of Community Based Natural Resource Management (CBNRM). CBNRM is an incentive based conservation and development model that is adaptively implemented by and for people who live with and directly depend on biological resources and who therefore have the greatest impact on such resources. In this model, communities are given rights of access to wild resources and legal entitlements to benefits that accrue from using the resources. This is intended to create positive social and economic incentives for the people to invest their time and energy in natural resource conservation. Typically, CBNRM initiatives have been implemented in ecologically marginal areas, with limited capacity for other natural resource based economies such as agriculture.

Operationally, CBNRM involves the following:

- The devolution of control and management responsibilities on natural resources from the State to the local people. This is done through appropriate legislative and policy changes; and,
- Building the technical, organizational and institutional capacity of local communities to assume management responsibilities over natural resources.

The success of CBNRM has largely depended on the level of devolution; donor commitment; policy changes; and links with tourism and hunting. The key economic driver for CBNRM in southern Africa has been wildlife (large mammals), mostly through trophy hunting and eco-tourism outside protected areas. The potential role of veld products in these areas is only beginning to be realized through value addition and commercialization. Such products have potential for nutritional, pharmaceutical and industrial use; and for generating income for rural people. Consequently, they have the capacity to broaden the economic viability of CBNRM initiatives. The main advantage of veld products is their wider distribution when compared to wildlife.

2.3.6 Implementation of Trans-boundary Natural Resource Management programmes.

There has been an increase in Trans-boundary Natural Resource Management (TBNRM) initiatives in southern Africa in recent years. These initiatives recognize the trans-boundary nature of natural resources and aim at managing them as such. According to Griffin *et al* (1999), TBNRM is defined as any process of cooperation across boundaries that facilitates or improves the management of natural resources for the benefit of all parties concerned. It falls under the following main categories:

- Trans-frontier Conservation Areas (TFCAs) in which the main objective is to conserve natural resources by linking protected areas across international boundaries. Their agenda is usually that of state conservation agencies and large national and international non-governmental organizations. An example of a TFCA is the Greater Limpopo Trans-frontier Park. The Park consists of the Kruger National Park in South Africa; Gonarezhou National Park in Zimbabwe; and the Coutadha 16 hunting concession region, Banhire and Zinave National Parks in Mozambique. Another example is the Lubombo TFCA that covers Ndumo-Tembe-Futi and Goba in Mozambique; Malolotja, Lubombo and Nsuban in Swaziland; and Kosi Bay and Pongola in South Africa; and,
- Trans-boundary Natural Resource Management Areas (TBNRMAs) in which the main objective is to sustainably manage natural resources in trans-boundary areas (ecosystems) for sustainable and improved livelihoods. TBNRMAs are to some extent an extension of the CBNRM concept to trans-boundary areas. An example of a TBNRMA is the Zimbabwe, Mozambique and Zambia initiative. Its objective is to facilitate dialogue among relevant stakeholders on how to effectively manage trans boundary-natural resources in the Gurusu district of Zimbabwe; the Zumbo district of Mozambique; and the Luangwa district of Zambia. The three districts converge upstream of the Cahora Bassa Dam on the Zambezi river.

The responsibility for managing TBNRM initiatives lies with the Member States concerned. This is largely because they depend on or assume similar levels of devolution and equally supportive policies and legislation across the participating countries. However, given that most TBNRM projects are still in their infancy, their impact on trans-boundary natural resource management and on human welfare in southern Africa still remains to be seen. Notwithstanding, the issue of adequate national capacity is very critical for their success. This is largely because the TBNRM process impinges on national sovereignty regarding certain natural resources. Unfortunately, some of the Member States have not yet clearly articulated their national policies on TBNRM. This apparent lack of clarity and consensus at national level partly explains the slow rate of implementation of some of the TBNRM initiatives. There is therefore an urgent need for Member States to develop national consensus, policies and capabilities on the subject. The capacity of local communities is also critical in TBNRM initiatives. Unfortunately, there is limited evidence to show that communities have been adequately consulted and made aware of the long and short-term implications (e.g. displacements) of some of TBNRM initiatives.

Another important consideration in TBNRM is the prospect of removing barriers to wildlife, domestic animal and human movement within and across countries. This has major implications on animal health and disease control, production and export markets in each country. A policy framework on animal health and disease control for TFCAs is therefore necessary.

2.3.7 Carrying out biodiversity related projects and programmes.

SADC, with financial and/or technical support from its development partners, is implementing a number of biodiversity related projects and programmes in the region. They include the following:

a) Environmental Education Programme. It is aimed at establishing a SADC network for environmental education. Its activities include the development of environmental education policy and the training of trainers.

b) SADC Biodiversity Support Programme. Its objective is to enhance and/or establish capacity and institutional mechanisms that enable Member States to collaborate in regional biodiversity conservation; to prevent and control the spread of Invasive Alien Species; and to apply Access and Benefit Sharing principles. The Regional Biodiversity Strategy is developed under the auspices of this Programme.

c) SADC Sub-regional Action Programme to combat desertification. Its objective is to build capacity for implementing the United Nations Convention to Combat Desertification in selected areas. The Programme has identified and selected the following regional Centers of Excellence (Lead Institutions): the Desert Foundation of Namibia for capacity building and research in desertification; the Tanzania Traditional Energy Development and Environment Organization/Commission on Science and Technology for sustainable rural energy development; the Faculty of Law at the University of South Africa on environmental law; the Faculty of Agriculture at the University of Zimbabwe for improved range land utilization; and the Farmer Support Group at the University of Natal (South Africa) for community participation, appropriate technology and indigenous knowledge.

d) Regional Early Warning Programme. It is responsible for forecasting the food production situation in the region. The resultant information provides advance early warning on the food security situation in Member States and the region as a whole.

e) SADC Plant Genetic Resources Centre. Its objectives are to:

- Keep the SADC plant gene base collection through the maintenance of long term storage facilities; and,
- Ensure the efficient coordination of plant genetic resources work within the region.

The Centre has collected and stored germplasm of some traditional crop varieties found in the region. It is therefore playing a key role in the *ex situ* conservation of agro-biodiversity as it compliments activities of national gene banks.

f) Miombo Eco-region Conservation Programme. Its goal is to contribute to the maintenance of biodiversity and functional ecosystems for the benefit of people and nature in the region. The Programme has identified biodiversity rich areas for possible conservation and sustainable use in the miombo eco-region of southern Africa.

g) The Southern African Natural Products Association (PhytoTrade Africa). It is a private sector initiative aimed at the value addition, commercialization and marketing of selected biological resources such as Non-Timber Forest Products (NTFPs). A number of NTFPs are already being processed, packaged and marketed nationally, regionally and internationally.

h) Zambezi Basin Wetlands Project Phase 2. Its purpose is to influence the development of national and regional policies and protocols that maintain and/or improve the ecological integrity of wetland ecosystems, while improving the well being of wetlands communities.

i) Regional Community Based Natural Resource Management Capacity Building project. Its goal is to contribute to poverty alleviation and sustainable livelihoods at rural household level from the management of natural resources by local communities. It attempts to introduce a peer review system based on standards that should be used to promote the delivery of CBNRM programmes.

j) Regional Agro forestry project. It aims to improve food security, reduce poverty and conserve the environment in southern Africa through the development and dissemination of appropriate agroforestry technologies. It operates in Malawi, Mozambique, Tanzania, Zambia and Zimbabwe.

k) The Southern African Botanical Diversity Network (SABONET). Its objectives are to:

- Inventory, document and publish the flora of southern Africa.
- Build the capacity of botanists through short and long term training; and
- Enhance the region's infrastructure for collecting, collating and storing specimens.

Ten SADC Member States are participating in the Network that has produced several botanical documents including the Red Data List and trained up to 22 people at postgraduate level.

l) Partnership for the Development of Environmental Law and Institutions in Africa (PADELIA). Its objective is to harmonize and strengthen environmental legislation that is trans-boundary in nature. Seven Member States are participating in the programme.

m) The Southern African Biodiversity and Environment Programme (BEP). The objective of the programme is to enable southern African countries to make informed decisions on biotechnology (biosafety) in relation to environmental management. All SADC Member States are involved in the initiative.

n) SADC Rhino project. It focuses on the recovery of the rhino, a threatened species in the region.

The foregoing examples demonstrate that SADC and its development partners are doing considerable work to address some of the challenges facing biodiversity in the region. The Regional Biodiversity Strategy builds upon and strengthens those efforts that fall within some of its 50 focal areas (sets of activities).

ANNEX III: CONSTRAINTS TO BIODIVERSITY CONSERVATION IN SADC MEMBER STATES

As part of the Regional Biodiversity Strategy preparation process, a regional consultative workshop on the subject was convened in Swaziland in June 2002. Member States were asked to highlight the major constraints to biodiversity conservation and its sustainable use in their countries. These national level constraints were used as building blocks for the Regional Biodiversity Strategy, which is a constraint-based initiative. Member States generated the constraints from their National Biodiversity Strategy and Action Plans (NBSAPs) and other national planning frameworks such as Poverty Reduction Strategy Papers, National Conservation Strategies, National Environment Action Plans and State of the Environment Reports. The country level information has been updated to incorporate developments that took place since 2002.

This Annex presents the national constraints as identified by Member States at the Swaziland regional workshop and subsequently updated through national consultations.

3.1 Angola

3.1.1 Status of the NBSAP

The Global Environment Facility (GEF) and the United Nations Development Programme (UNDP) are funding and supporting the process of elaborating on the NBSAP. The exercise, which started in October 2004, will take 18 months.

3.1.2 Constraints identified

- Insufficient information and scientific data on the status of biodiversity in the country.
- Lack of inventory and monitoring systems.
- Insufficient legislation for biodiversity protection.
- Weak institutional arrangements for planning and managing the utilization of biodiversity.
- Poor management of the protected areas.
- Insufficient funds for implementing projects on biodiversity and the sustainable use of natural resources.

3.2 Botswana

3.2.1 Status of the NBSAP

The NBSAP was finalized in December 2004. It is in the process of being printed for distribution to stakeholders.

3.2.2 Constraints identified

- Fragmentation and gaps in environmental legislation and lack of enforcement.
- Lack of gazetted National Conservation Act.
- Absence of redress of the Convention on Biological Diversity (CBD) obligations within the national development plan.

- Lack of cross- sectoral knowledge of the CBD and country obligations.
- Lack of institutionalisation of Clearing House Mechanisms (CHMs) within government systems.
- Uncontrolled use of forest reserves by the tourism industry.
- Few flora and fauna inventories that do not cover the whole country.
- No synthesis of environmental projects' outputs. Current, past and/or end of project reports are unavailable, inaccessible and/or lost.
- Lack of coordination and strategy in the area of trans boundary initiatives.
- Lack of inventory of biodiversity expertise in the country.
- No cross- sectoral training needs assessments.
- No country strategy for biodiversity training and capacity building.

3.3 Lesotho

3.3.1 Status of the NBSAP

The NBSAP was completed and approved by Cabinet. Based on the country study, GEF is supporting a project on the conservation of biodiversity in the southern part of Lesotho.

3.3.2 Constraints identified

- Inadequate participation of communities in the design, management and planning of biodiversity programmes due to the top-down approach that is used.
- Low levels of awareness and appreciation of the value of biodiversity conservation and inadequate incentives for its conservation.
- Unsustainable use of biodiversity outside protected areas due to inadequate provision and protection of community rights to claim exclusive rights to manage their biological resources.
- Inadequate knowledge on ecosystems functions and on the conservation status of species.
- Limited appreciation of the importance and contribution of biodiversity to the national economy and to local communities by policy makers.
- Inadequate integration of biodiversity conservation into sectoral plans, policies, legislation and programmes.
- Limited application of Environmental Impact Assessment (EIA) procedures.
- Inadequate representation of the full range of natural ecosystems in the protected area network.
- Lack of appreciation of the importance of traditional knowledge systems to biodiversity conservation.
- Inadequate research and monitoring of biodiversity threatening processes.
- Lack of a national policy on the conservation and sustainable use of biodiversity.

3.4 Malawi

3.4.1 Status of the NBSAP

Malawi produced a draft NBSAP in 1999. However, it became apparent that the draft document was not acceptable to most stakeholders. It was therefore decided that the document be reviewed. The document was finalized in July 2005.

3.4.2 Constraints identified

- Limited alternative livelihood sources to address poverty.
- Limited harmonisation and integration of biological biodiversity, sustainable use and equitable sharing of biological resources into sectoral and cross-sectoral policies, plans and programmes, including EIAs.
- Limited specialized personnel dealing with the conservation and sustainable use of biological diversity.
- Inadequate valuation of biological resources to determine their economic value and associated management costs.
- Inadequate incentives for local level participation in biodiversity conservation and its sustainable use as well as lack of recognition of indigenous knowledge systems.
- Inadequate enforcement of initiatives on the conservation, sustainable use and fair and equitable sharing of biological resources.
- Unsustainable financing mechanisms for biological diversity conservation and sustainable use initiatives.
- Inadequate support to NGOs and the private sector in diversity conservation and sustainable use initiatives.
- Inadequate appreciation and awareness of the importance of biological diversity.
- Inadequate representation of the full range of natural ecosystems in the protected area network.
- Inadequate participation of local communities in the management and design of biodiversity programmes.

3.5 Mozambique

3.5.1 Status of the NBSAP

The NBSAP was completed and approved by Cabinet in July 2003. However, its implementation has not started due to financial constraints.

3.5.2 Constraints identified

- Inadequate biodiversity inventory and monitoring systems.
- Inadequate implementation of appropriate *in situ* and *ex situ* conservation measures.
- Inadequate representation of the full range of natural ecosystems in the protected area network.
- Inadequate coordination and weak institutional framework.
- Inadequate legal framework on biodiversity issues.
- Inadequate incentives for local level participation in biodiversity conservation and sustainable use initiatives.
- Lack of appreciation of the importance of traditional knowledge systems to biodiversity conservation.
- Inadequate knowledge and control of Alien Invasive Species and Genetically Modified Organisms (GMOs).
- Low level of awareness and appreciation of the value of biodiversity conservation.
- Inadequate incentives for community participation in biodiversity conservation and sustainable use.

- Unsustainable financing mechanisms for biodiversity conservation and sustainable use initiatives.

3.6 Swaziland

3.6.1 Status of the NBSAP

The document was completed but is still awaiting Cabinet approval.

3.6.2 Constraints identified

- Inadequate representation of the full range of natural ecosystems in the protected area network.
- Unsustainable use of biodiversity outside protected areas due to inadequate provision and protection of community rights to claim exclusive rights to manage their biological resources.
- Inadequate conservation of agro-biodiversity.
- Bio safety issues not adequately catered for in the existing biodiversity initiatives.
- Weak institutional and legal frameworks for implementing biodiversity conservation.
- Low levels of awareness and appreciation of the value of biodiversity conservation.

3.7 South Africa

3.7.1 Status of the NBSAP

The NBSAP has been completed and now awaits approval by the Director General of the Department of Environmental Affairs and Tourism.

3.7.2 Constraints identified

- Lack of integrated and coherent national biodiversity information system.
- Poorly developed strategies for conservation and sustainable use outside protected areas.
- Lack of a systematic approach to protected area development and management, resulting in a protected area network that is not representative.
- Lack of a strategy on agro-biodiversity.
- No uniform strategies for the application of the ecosystem approach to conservation.
- Lack of integration and consolidation of *ex-situ* conservation initiatives.
- No overall strategy or mechanisms for promoting the sustainable use of biodiversity (e.g. CBNRM programmes).
- No national strategy or regulatory framework for Access and Benefit Sharing.
- Low levels of public awareness around biodiversity and its economic value.
- No national strategy or mechanisms for the control and eradication of Invasive Aliens other than plants.
- Poorly developed incentive programmes.
- Complex and often inefficient institutional arrangements, including lack of clarity on the division of responsibilities.
- Poor progress in mainstreaming biodiversity into other sectoral policies and programmes.

3.8 Namibia

3.8.1 Status of the NBSAP

Biodiversity in Namibia-Namibia's ten-year strategic plan of action for sustainable development through biodiversity conservation 2001-2010, ISBN 0-86 976-587-6) was published as a 138-page booklet with glossy cover in 2002, in preparation for the World Summit on Sustainable Development. It was Namibia's first sustainable development strategy. It received and incorporated ministerial feedback from stakeholder ministries in 2002. It is hoped that the document will be submitted to Cabinet by the Ministry of Environment and Tourism and be endorsed without problems due to the very wide stakeholder and specialist consultations during its preparation.

3.8.2 Constraints identified

i. Conservation of biodiversity

- Gaps in the protected area network
- Communal and freehold conservancies
- Conservation measures in and outside protected areas
- Address the needs of endemic and threatened species
- *Ex-situ* and *in-situ* conservation capacity

ii. Sustainable use of biological resources

- Capacity to harvest resources sustainably
- Monitoring and incentive systems for sustainable use
- Conservation and sustainable use of agricultural biodiversity
- Use of indigenous knowledge systems in Natural Resource Management (NRM).
- Bio prospecting and bio trade
- Safe use of biotechnology

iii. Environmental change and threats

- Reliable environmental decision making
- Monitoring, detecting and predicting environmental change
- Monitoring biodiversity and ecological function
- National capacity in biosystematics
- Monitoring environmental threats
- Climate change
- Desertification and land degradation
- Alien Invasive Species
- Pollution
- Restoring degraded ecosystems

iv. Sustainable land management

- Information to guide land use planning and land reform
- Biodiversity – compatible land & resource uses / management
- Sustainable agriculture
- Sustainable forest management
- Sustainable desert, savanna and wood land management
- Biodiversity & ecological functions of mountain ecosystems

v. Wetland management

- Ecological functions and diversity
- New wetland conservation areas
- Integrated land & water management
- Awareness of wetland values & threats

vi. Coastal and marine ecosystem management

- Impacts of resource use activities
- Policy and legislation
- Aquaculture activities
- Marine protected areas
- Pollution of coastal waters
- Taxonomic collections and databases
- Marine bio prospecting
- Integrated Coastal Zone Management
- Information and awareness

vii. Integrated planning

- Integrated sectoral planning and implementation
- Policy and legal frameworks
- Decentralisation and regional management
- Partnerships involving government, NGOs and the private sector

viii. Namibia's role in the larger world community

- Obligations to international treaties
- International assistance and national budgets for environmental management
- International research collaboration

xi. Building capacity for biodiversity management

- Public awareness of biodiversity
- Management capacity
- Effective participation of disadvantaged groups
- Strengthening community capacity
- Strengthening biodiversity centres of excellence

3.9 Zambia

3.9.1 Status of the NBSP

Zambia completed its NBSP in 1999. In terms of implementation, a project on protected area networks is already underway with GEF funding. Another project is being developed for the add-on enabling activities under GEF.

3.9.2 Constraints identified

- Inadequate conservation of ecosystems and protected areas due to inadequate knowledge of these ecosystems and protected areas, poor representation of all the ecosystems in the protected area network and inadequate protection of protected areas.

- Unsustainable use and management of biodiversity mainly as a result of lack of incentives.
- Inequitable sharing of benefits from the utilisation of biodiversity, again as a result of inadequate provision and protection of community rights to claim ownership and benefits from biological resources.
- Inadequate conservation of crop and livestock diversity.
- Inadequate legal and institutional frameworks and the needed human capacity to deal with issues of bio safety.
- Inadequate legal and institutional framework and needed human capacity to implement programmes for biodiversity conservation.

3.10 Zimbabwe

3.10.1 Status of the NBASP

Zimbabwe completed its NBASP in 1998. The document was officially launched in 2000. However, there is consideration for an addendum to include issues of biosafety, biotechnology and desertification. Implementation of the Plan has started. GEF funded projects on Traditional Medicinal Plants and National Self Capacity Assessment are being carried out. A number of other project proposals have been developed.

3.10.2 Constraints identified

- Absence of comprehensive and elaborate biodiversity inventory and monitoring programmes.
- Inadequate incentives for local communities and individuals to undertake biodiversity conservation and sustainable use initiatives in both protected and non- protected areas.
- Inadequate environmental awareness, education and training at various stakeholder levels.
- Limited appreciation of the importance and contribution of biodiversity to the national economy and to local communities by policy makers.
- Inadequate, conflicting and poorly enforced pieces of legislation that tend to adversely affect biodiversity conservation and its sustainable use. This has now been addressed through the Environment Management Act (EMA).
- A limited financial base and institutional capacity to facilitate the formulation, implementation and monitoring of biodiversity projects at various levels.
- Inadequate affordable alternatives to reduce reliance on natural resources at local level.
- Inappropriate research and extension approaches in biodiversity conservation and its sustainable use.

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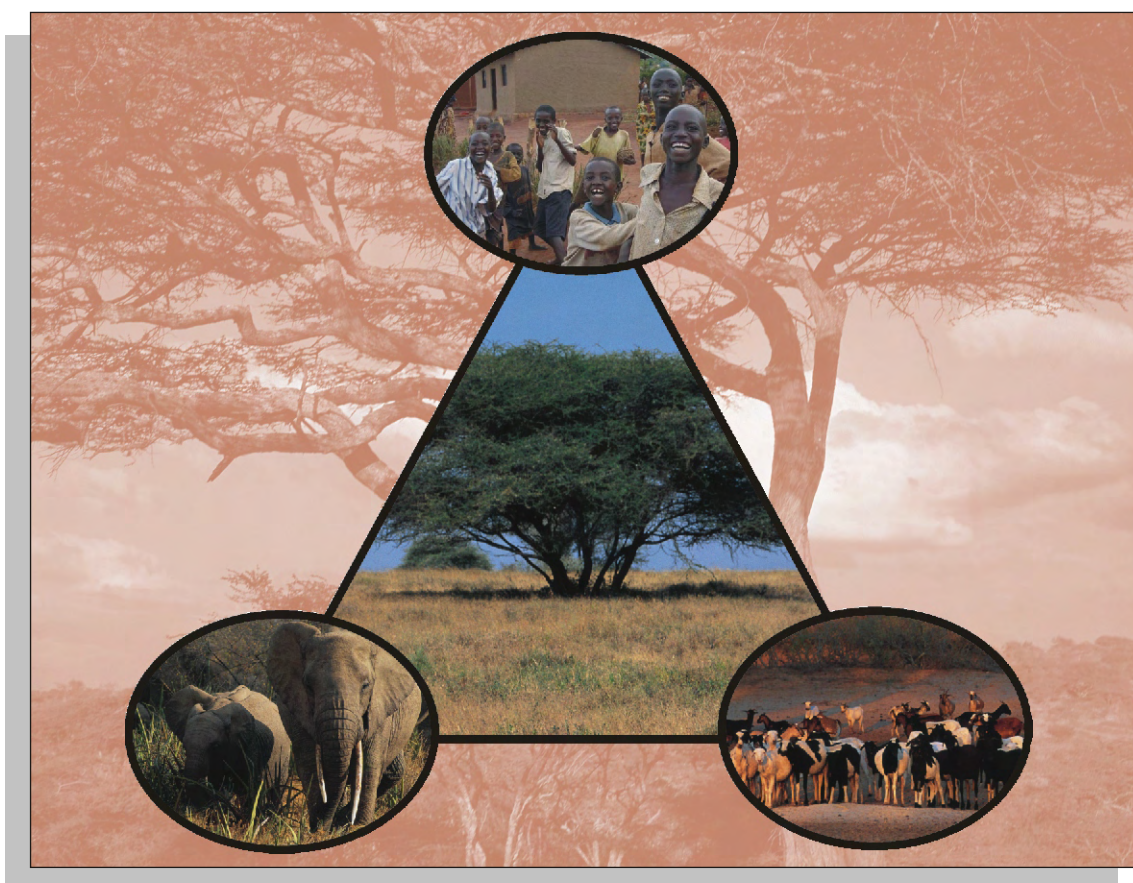
The IUCN Species Survival Commission

Conservation and Development Interventions at the Wildlife/Livestock Interface

Implications for Wildlife, Livestock and Human Health

Edited and compiled by Steven A. Osofsky

Associate Editors: Sarah Cleaveland, William B. Karesh, Michael D. Kock,
Philip J. Nyhus, Lisa Starr and Angela Yang



Occasional Paper of the IUCN Species Survival Commission No. 30

Executive Summary

Moving Conservation *AHEAD*

The “Southern and East African Experts Panel on Designing Successful Conservation and Development Interventions at the Wildlife/Livestock Interface: Implications for Wildlife, Livestock and Human Health” forum brought together nearly 80 veterinarians, ecologists, economists, wildlife managers and other experts from Botswana, Kenya, Malawi, Mozambique, Namibia, South Africa, Tanzania, Uganda, Zambia, Zimbabwe, France, the United States and the United Kingdom to develop ways to tackle the immense health-related conservation and development challenges at the wildlife/domestic animal/human interface facing Africa today, and tomorrow. This volume attempts to capture invitees’ uniquely grounded insights, and their ideas for making the long-overdue “one health” perspective a reality in practice.

This forum represented the launch of the Wildlife Conservation Society’s *Animal Health for the Environment And Development (AHEAD)* initiative, a program developed by WCS’s Field Veterinary Program in response to the growing recognition of the critical role of animal health in both conservation and development. Throughout the world, domestic and wild animals are coming into ever-more intimate contact. Without adequate scientific knowledge and planning, the consequences can be detrimental on one or both sides of the proverbial fence. But with the right mix of expertise armed with the tools that the animal health sciences provide, conservation and development objectives have a much greater chance of being realized – particularly at the critical wildlife/livestock interface where conservation and agricultural interests meet head-on. The *AHEAD* initiative focuses on several themes of critical importance to the future of animal agriculture, wildlife, and, of course, people: competition over grazing and water resources, disease mitigation, local and global food security, zoonoses, and other potential sources of conflict related to the overall challenges of land-use planning and the pervasive reality of resource constraints. To date, neither nongovernmental organizations, nor aid agencies, nor academia have holistically addressed the landscape-level nexus represented by the wildlife health/domestic animal health/human health triangle.

WCS believes that “win-win” solutions to health, land-use, and broader socioeconomic challenges are attainable. *AHEAD*, created to foster a sharing of ideas that will lead to concrete and creative initiatives addressing conservation and development challenges at the livestock/wildlife/human health interface, can help catalyze these solutions. By bringing regional expertise together to compare lessons learned, fostering communications networks that are often lacking even among practitioners in relatively close proximity, and by bringing a global perspective to problems that can benefit from the experiences of other regions, this initiative can pay dividends for protected areas as well as buffer zone communities, for core areas as well as conservancies and corridors – the places where tensions and challenges at the livestock/wildlife interface are greatest. Conflicts between livestock and natural resources must be dealt with if there is

to be any hope for peaceful coexistence between the two sectors upon which so many people’s livelihoods depend. The papers in this *Proceedings* make this quite clear.

There is probably no region on earth where animal health policies and their downstream consequences have had as tangible an effect upon the biotic landscape as in Africa, southern Africa in particular. In many parts of the world, land-use choices are often driven by government (domestic and/or foreign) incentives or subsidies that can favor unsustainable agricultural practices over more ecologically sound natural resource management schemes. Of course, livestock will remain critically important both culturally and economically in much of the region. But provided with a better understanding of disease epidemiology and grasslands ecology, land-use planners can begin to take the true costs associated with both disease control schemes and environmental degradation related to livestock management practices not well-suited to a particular ecosystem into account, and therefore more often favor a return to natural production systems. For example, in semi-arid parts of southern Africa, foot and mouth disease control programs, implemented to support beef production for an export market, may not be as profitable or as environmentally sustainable as a return to multi-use natural systems emphasizing endemic wildlife species (consumptively and non-consumptively). When it comes to animal health programs and policies in transboundary landscapes, where domestic as well as wild animals have opportunities to cross international borders, making the right decisions becomes even more critical. Clearly, animal health issues – and their implications for human health and livelihoods – must be addressed by any regional agricultural or natural resources management strategies if they are to succeed.

As we look around the world, impacts from interactions between livestock and wildlife (and habitat) are often profound. The issues at this interface represent an unfortunately all-too-often neglected sector of critical importance to the long-term ecological and socio-political security of protected areas and grazing lands worldwide. Whether we are talking about the ongoing tuberculosis crisis in and around South Africa’s Kruger National Park, or Yellowstone National Park’s brucellosis saga costing U.S. authorities millions of dollars to manage, these issues merit more proactive attention than they have received to date.

We hope that conservation and development colleagues from within and, as importantly, *outside of* the health science professions will find this volume thought-provoking, insightful, practical, and applicable to their daily work.

As socioeconomic progress demands sustained improvements in health for people, their domestic animals, and the environment, we hope we’ve been successful in drawing attention to the need to move towards a “one health” perspective – an approach that was the foundation of our discussions in Durban, and a theme pervading this *Proceedings*.

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chapter 5

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Building support for protected areas using a “One Health” perspective

by Steven A. Osofsky, Richard A. Kock, Michael D. Kock, Gladys Kalema-Zikusoka, Richard Grahn, Tim Leyland and William B. Karesh

Editor's introduction

Issues affecting the interplay among wildlife health, the health of domestic animals, and human health are receiving inadequate attention from protected area managers. This chapter encourages an innovative framework, called the “One Health Paradigm,” by taking a broad ecological definition of health that brings together many disciplines that too often have remained isolated from each other. This ecosystem approach to health issues is especially pertinent in the parts of the world where domestic animals often interact with the wild species of greatest interest to protected area managers. Steve Osofsky and his colleagues also provide a perspective on the many relationships between the health of wildlife and the health of people living in the often-remote areas adjacent to protected areas, where human health care

is often in short supply. Building a more appropriate response to the problems of disease transmission across the interface between wildlife and domestic animals can also lead to improvements in the health status of the people living around protected areas, thereby building a more positive attitude towards the protected area and conservation authorities. This chapter also emphasises the highly dynamic relationship between people, domestic animals, and wildlife, calling for significant investments in training, monitoring and research in order to ensure a healthy outcome for all concerned. The elements in the “One Health” paradigm provide a solid basis for building support for protected areas from those living near them and those working on human and animal health.

Introduction

In 1933, Aldo Leopold observed that “the role of disease in wildlife conservation has probably been radically underestimated” (Leopold, 1933). Despite this recognition early in the 20th century, conservation efforts worldwide are still being hampered because of their failure to recognise the critical role that health plays in animal population dynamics, species survival, and follow-on impacts on the human condition. Improving the health of people and their domestic animals is not only a key step to raising living standards and improving livelihood security, it is the single most effective way to reduce the incidence of disease transmission to highly susceptible wildlife populations (WCS FVP, 2003c), including those that live within or utilize protected areas.

Throughout the world, domestic and wild animals are coming into ever more intimate contact. Without adequate scientific knowledge and planning, the consequences can be detrimental on one or both sides of the proverbial fence. But with the right mix of expertise armed with the tools that the animal health sciences provide, conservation and development objectives have a much greater chance of being realized, particularly at the critical wildlife/livestock interface where conservation and agricultural interests meet head-on.

Infectious diseases are increasingly being recognised as important “emerging issues” by health specialists, disease ecologists, conservation biologists, wildlife managers, and protected area planners (Meffe, 1999; Deem *et al.*, 2002; Lafferty and Gerber, 2002; Aguirre *et al.*, 2002; Daszak and Cunningham, 2002; Graczyk, 2002; WCS FVP, 2003b; Kalema-Zikusoka, 2005; World Parks Congress Outputs 2003; Osofsky *et al.*, 2005). Examples of emerging diseases that have impacts on human health and biodiversity include:

- from 2001–2003 the Ebola virus killed dozens of people and wiped out hundreds of gorillas in central Africa (WCS FVP, 2003a) and remains of major concern;
- West Nile virus has afflicted a wide range of domestic and wild animals and people in North America (Marfin *et al.*, 2001);

- bovine tuberculosis (BTB) is now known to occur in buffalo, lion, and a range of other species in Kruger National Park (Clifton-Hadley *et al.*, 2001; Bengis, 2005; Michel, 2005);
- brucellosis is compromising bison populations in North America in terms of management implications (Bienen, 2002; Gillin *et al.*, 2002); and
- foot and mouth disease outbreaks in southern Africa affect livestock and wildlife as well as land-use policies over vast areas (Thomson *et al.*, 2003).

It is clear from these examples that the issues of health and disease need to be brought into the conservation mainstream (Osofsky *et al.*, 2000; Deem *et al.*, 2001; WCS FVP, 2003a).

Box 5.1

The AHEAD Initiative

The **AHEAD** (**A**nimal **H**ealth for the **E**nvironment **A**nd **D**evelopment) initiative, led by the Wildlife Conservation Society and partners, focuses on several themes of critical importance to the future of livestock, wildlife, and, of course, people: competition over grazing and water resources; disease mitigation; local and global food security; zoonoses (diseases transmitted between animals and people); and other potential sources of conflict related to the overall challenges of land-use planning and the pervasive reality of resource constraints. Prior to this initiative, neither non-governmental organizations, nor aid agencies, nor academia have holistically addressed the landscape-level nexus represented by the wildlife health/domestic animal health/human health triangle, especially as it relates to protected areas.

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Impacts from interactions between livestock, wildlife and people (and habitat) are profound in many parts of the world. The issues at this interface represent an unfortunately all-too-often neglected sector of critical importance to the long-term ecological and sociopolitical security of protected areas and grazing lands worldwide. Whether the issue is the ongoing bovine tuberculosis crisis in and around South Africa's Kruger National Park, or Yellowstone

Village meeting, Zambia.



© Steve Osofsky, DVM

National Park’s ongoing brucellosis saga costing U.S. authorities millions of dollars to manage, these issues merit more proactive attention than they have received to date. It is important to note that many of the diseases of concern to landscapes of conservation importance are essentially invasive alien species, and are either already negatively affecting biodiversity or have the potential to do so. As people and their domestic animals penetrate once pristine areas and expand their range and intensity of activities, the risk of transmitting serious diseases to wildlife increases significantly. Diseases of people, domestic animals and wildlife are now being recognised as an increasing challenge to biodiversity conservation, as well as to efforts to improve the quality of life for people. Although endemic (i.e., native) wildlife diseases play important ecological roles, human activities in many cases have disrupted ecosystems, leading to both gradual and catastrophic losses of wildlife populations. A “One Health” approach is not about interfering with nature – it is about trying to help systems already perturbed by pathogens that may or may not “belong” within them to re-establish a state wherein disease does not threaten vital conservation and development objectives. Many factors affecting health and the basic epidemiology of multi-host diseases are still poorly understood, and conservation and wildlife management decisions are often made without complete information. The critical edge – where the health of wildlife, domestic animals, and people meld together and are best addressed as “One Health” – exists at the borders of most protected areas of the world.

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The “One Health” paradigm: some basic concepts

People and the natural resources from which they derive their livelihoods are integral parts of their given ecosystem – a dynamic complex of plant, animal and micro-organism communities and the nonliving environment interacting as a functional unit. The World Health Organization (WHO) defines health as a state of complete physical, mental and social well-being and not just the absence of disease and infirmity (Deem *et al.*, 2001; Last, 1983), and this definition implies a link between human health and ecosystem integrity. Ecosystems provide vital services to human and animal communities, for example, by providing natural filtering systems, sources of food and fibre, and clean water (Rapport, 1998). Disruption of some of these natural services, these ecosystem “products,” will have impacts on air, water, and other renewable resources and thus health.

The concept of “One Health” – the interface between human health and that of the environment – is not new. During the 1960s and 1970s visionary attempts were made to construct a bridge between, for example, medicine and agriculture. Discussions on medical ecology and zoology, animal monitors of the environment, and comparative biology and medicine were the precursors to a more holistic approach to animal and human health (Schwabe, 1974). This concept has been further developed through programmes such as Envirovet (Beasley, 1993) and the development of ecosystem health as an integrative science (Rapport *et al.*, 1998).

The *AHEAD* approach fosters information sharing and consensus building among, for example, wildlife health scientists and rural livestock keepers.



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The “One Health” concept takes *conservation medicine* a step further by broadening an ecological definition of health (Kock, 1996), while acknowledging that conservation medicine’s primary goal is the pursuit of ecological health – the health of ecosystems and the species that live within these systems (Else and Pokras, 2002; Tabor, 2002). Conservation medicine attempts to bring together many disciplines, including human and public health, epidemiology, veterinary medicine, toxicology, ecology, and conservation biology (Meffe, 1999). Adopting an ecosystem approach to health issues related to protected areas and the communities that live close to or in these areas represents an attempt to bridge the gaps that exist between the different disciplines and create an enabling environment for expanding benefits to both protected areas and local people. Conservation medicine indeed encourages practitioners to look both upstream and downstream for potential environmental impacts of land uses and activities (Tabor, 2002). A “One Health” approach can be attractive to a broader constituency, as it can be viewed with equal clarity through a conservation,

development, or public health lens. Powerful biomedical tools are fortunately available to address these complex issues and develop preventive approaches.

The state of health of an ecosystem can be judged by criteria very similar to those used for evaluating the health of a person or animal, namely, homeostasis (having balance between system components), absence of disease, diversity and complexity, stability and resiliency, and vigour and scope for growth. An ecosystem can be viewed as a patient (Rapport, 1998) and can be evaluated in terms of objective standards that relate to the system’s capacity for organization, vigour, and resilience. Identification and diagnosis of problems and the application of solutions along with biodiversity assessment and monitoring represent a basic approach to ecosystem health care. In biomedical terms this would be achieved through detection, diagnostics, prognostics, treatment, and prevention. In the case of ecosystem health, the precautionary principle supports an approach based on the tenets of preventive medicine – anticipatory

action to protect the environment from possible or irreversible harm (Calver, 2000). The “ecosystem as patient” metaphor can also help shape our overall approach to conservation: “Critical clinical problems mandate a rigorous diagnostic plan, a multifaceted therapeutic plan, clear communication, and short- as well as long-term monitoring. Critical conservation problems deserve no less.” (Osofsky, 1997). In addition, a *preventive* medicine approach allows for action to be taken with a causal relationship being reasonably suspected if not proven, thus lessening the risks of uncertainty.

The development of ecological indicators can yield powerful tools that can generate scientific information on the status or trends of important ecosystem health parameters (Sayre *et al.*, 2000). In parallel, epidemiological tools such as disease surveillance and monitoring can be linked to various indicators in terms of disease and health trends. The use of indicators will help simplify data for decision makers, and provide a focal point for strategic planning, policy formulation, resource allocation, and specific management actions (Boyce, 2003).

The wildlife-livestock disease interface in Africa

The wildlife-livestock interface means different things to different people. The many facets of the interface, such as health, conservation, environment, culture, and economics, have been issues since livestock became an integral part of the landscape. The interface has positive and negative aspects and it has been a source of conflict in many areas, often as a result of misunderstanding and polarization of opinion between ecocentric and anthropocentric forces in society (Boyd *et al.*, 1999). Attention here is given to those elements relevant to the health of the large mammal communities in Africa, where it is urgent to find solutions to the problems of abject poverty, poor health status for people and animals, and threats to the environment and biodiversity.

In Africa’s dry-land pastoral systems, livestock and people share resources with the most diverse array of wild ungulates on earth (R. Kock *et al.*, 2002). With improvements in human health care, the population is

growing exponentially but the economies of most countries are not keeping pace correspondingly. Poverty is both acute and widespread, with significant portions of the continent’s people living on less than US\$1 per day (FAO/UNEP/CGIAR, 2004). Communities are often food insecure, especially where land degradation is prevalent and social systems have broken down, which often happens during times of war or other unrest. Consequently, there is considerable international pressure to accelerate development and alleviate poverty (Thrupp and Megateli, 1999). With rapid economic development, environmental change and loss of biodiversity can be expected; indeed, this has been the experience in many countries, where one form of poverty is thus replaced by another.

Eighty percent of Africa’s population is rural and 70 million people are wholly dependent on livestock with no alternative source of food or wealth (AU/IBAR, 2002). Yet Africa accounts for only 2% of the total value of world trade in livestock and livestock products and imports twice as much as it exports, with the net imports increasing at 4% per year (Thambi, 2003). The single most important constraint on the African livestock export trade is the “Sanitary and Phytosanitary Measures” of the World Trade Organization (WTO) (OIE, 2003). The status of endemic livestock disease(s) in many African countries limits exports of meat, serving as a barrier to trade that is a key concern of policy makers. However, the impact of these trade-sensitive diseases is minimal within Africa, especially among pastoral livestock and poor farmers (Perry *et al.*, 2002). As the maintenance of these extensive livestock systems, and to some extent the close association between wildlife and livestock, is the main reason for the current disease status, pressure is building among certain political elements in Africa for changes that may threaten both traditional pastoral society and also wildlife resources (R. Kock *et al.*, 2002). These WTO rules are set up by the developed nations, essentially in their own self-interest, and African nations have not been able to influence changes in these regulations to their own advantage (Thambi, 2003).

Some feel that the international community’s desire to conserve Africa’s wildlife as a global environmental

good underpins its reluctance to support livestock development based on the belief that livestock is a major factor in land degradation and loss of wildlife (Bourn and Blench, 1999). However, positive environmental benefits can be attributed to well-managed livestock systems as much as poor management can lead to negative impacts (Mace, 1991). Often, livestock are only part of the picture in terms of the trend towards a general fragmentation of habitats and disruption of natural ecosystems, including the disappearance of large mammal species across much of their historic range, increases in agriculture and settlement, and disruptions to traditional systems of transhumance and mobility. Recent studies have shown that pastoralists' strategies are optimal for sustaining communities and resources, and that they are a force in conserving the environment to the benefit of wild species (Roth, 1996; Scoones, 1994).

The improved understanding of the role of livestock in dry lands is accompanied by an increasing awareness of a new potential value of the wildlife resource through community-based management. Ecotourism and other forms of utilization (both consumptive and non-consumptive) are becoming increasingly important in the economies of at least some African countries (Chardonnet *et al.*, 2002;

Jansen *et al.*, 1992; Cumming and Bond, 1991). To further support this, studies of mixed systems indicate considerable environmental benefits as well as economic ones in some settings (Western, 1994). It can be argued that one of Africa's main advantages (perhaps the only one in economic terms) over the rest of the world is its extensive and diverse wildlife resource, which is so attractive to tourists. This is not to say that livestock are not important on the continent but, to put it into context, Chile and Argentina taken together currently have a larger livestock industry than all the countries of Africa combined (FAO, 2003). So to sacrifice wildlife in favour of developing a competitive commercial livestock sector has little justification, but to develop both wildlife and livestock resources together (not necessarily defaulting to one or the other exclusively) is a key to efficient utilization of available resources.

Given the economic benefits of wildlife, health issues are an increasing concern in this field especially where epidemics and chronic disease problems occur as a result of *introduced* (alien) disease. A review of the co-existence of livestock and wildlife (Bourn and Blench, 1999) reported that wildlife disease was not a constraint, but lack of information on diseases in the field makes this a risky conclusion. Other studies have found that disease can

Plains zebra, southern Africa.



adversely affect wild animal population dynamics in the short and long term (Hudson and Dobson, 1989; Rodwell *et al.*, 2001; Jolles, 2003; Lankester, 2003; Hwang, 2003) and increases the risk of the extinction of rare species (Andanje, 2002). The initial impacts of exotic disease can be devastating and depress population growth for decades (Mack, 1970; Plowright, 1982; Kock *et al.*, 1999); conversely, control or eradication of these pathogens can lead to dramatic recovery of populations (Sinclair, 1970). The more subtle effects of disease are to make the population more susceptible to other impacts, such as predation, and effectively depress numbers well below limitations related to food resource available (Joly, 2003). The decision on what to accept as a natural or an acceptable disease dynamic within a biological system may well in the end be a value judgement, but in terms of resource use, consumptive or otherwise, depressed populations will limit the options.

The emergence of wildlife and livestock disease in many parts of the world is partly a result of the expansion of human and livestock populations into wildlife areas, with dramatically disturbed habitats and novel interactions, but may also reflect increased awareness and monitoring of diseases. The trend towards establishing larger and more integrated wildlife systems is also evident in Africa, e.g., through transfrontier parks (Gelderblom *et al.*, 1996) and extension of wildlife management areas into communities, conservancies, and wildlife corridors (IIED, 1994; Hulme and Murphree, 1999). Clearly, conserving wildlife requires a more integrated approach that will incur costs. These initiatives will inevitably be a compromise with other land use practices, and will result in complex disease phenomena (Rosenzweig, 2003) that will need novel solutions and interventions – ideally proactive ones. This is the contemporary challenge to the veterinary community, disease biologists, development specialists, and protected area managers alike. It is vital that the interests of livestock keepers living around protected areas are taken into account in the management of the wider wildlife systems.

Conditions have changed significantly over the past century, with many examples of transcontinental disease introductions (rinderpest, BTB) causing

persistent problems in wildlife and livestock populations. The wild species had not been exposed to these agents for millennia, so no co-evolution of host and disease agent had developed, with serious and persistent consequences (Bengis *et al.*, 2002; de Lisle *et al.*, 2002). Besides these initial introductions of major diseases through importation of livestock to the continent, the co-existence of people and their livestock with wildlife is not governed by “natural” mechanisms; at best they are only partially integrated, especially in pastoral systems when contact may occur seasonally or only in drought years. Thus endemism of disease organisms is disturbed and this is another reason the interface deserves close attention.

Countries where extensive wildlife populations are integrated with pastoral systems have no possibility of effective separation. In these locations the proposed solution is the creation of small export zones from which wildlife is excluded. Effectively, this means the creation of ‘protected areas’ for livestock, where foot and mouth disease, for example, can be controlled. This approach could resolve the conflict and provide the opportunity for commercial livestock development without much affecting the important wildlife resources in these parts of Africa. This would also support the culture and traditions of pastoral peoples. The concept does not exclude the opportunity for links between pastoral communities and the export zones, although a system of quarantine and the mechanisms for this would need to be explored. A fundamental issue relates to product quality and market preferences, and it will be interesting to see if some improved penetration into markets can be achieved for range or pastoral cattle (Thomson *et al.*, 2004). As the loss of key grazing resources has been a factor in the decline of pastoralism, this potential reconnection with mainstream livestock economics and what would amount to fattening areas could strengthen the overall livestock economy and reduce pressure on protected areas, which are frequently used for this purpose. This will also enable traditional peoples to benefit from a mixed-species system and develop wildlife-related livelihoods in addition to their livestock, while bypassing the veterinary restrictions that have been a constraint to market access.

The “One Health” paradigm and protected areas

In balancing the needs and expectations of Africa’s rural inhabitants with those of wildlife conservationists, including protected area managers, it is necessary to consider how disease interactions influence human, livestock, and wildlife health (WCS, FVP, 2003a, 2003b; Kalema-Zikusoka, 2005; Kock, 2005b; Bengis, 2005) while keeping in mind that the role of wildlife health in conservation goes beyond the presence or absence of disease (Mainka, 2001; Deem *et al.*, 2001). Wildlife health, in the broadest sense, is a holistic concept with a focus on populations and the environments in which they live. This focus must of course include human populations and livelihood needs, especially at the wildlife-livestock interface. While some caution is merited to prevent making too simplistic a linkage between “ecosystem health” and “human health,” potentially at the expense of wildlife and conservation funding (Osofsky *et al.*, 2000), it is clear that a paradigm shift in Africa is needed. Health is the key linkage that can contribute to human well-being and, therefore, serve as a logical entry point to promote environmental stewardship and healthy ecosystems (Margoluis *et al.*, 2001).

In many instances, both historically and currently in Africa (Kock *et al.*, 2002), disease control methods that have been adopted by veterinary and health authorities have been drastic, have had a significant negative impact on ecosystem health and biodiversity, and have rarely considered the broader issues

surrounding and influencing health. Classic disease control methods include vaccination, test and slaughter, blanket slaughter, vector control, and movement controls including fencing. Many of these require “out-of-the-box” thinking by traditional veterinary and animal health authorities, including the promotion and legalization of community-based animal health systems. The indiscriminate use of fencing to control disease transmission between livestock and wildlife without considering connectivity and vital linkages between ecosystems is an example of a cause for concern (Albertson, 1998; Keene-Young, 1999; Scott Wilson and EDG, 2000; Thomson *et al.*, 2003; Kock *et al.*, 2002; Martin, 2005).

Historically, African protected areas have been managed without due concern for the communities that live nearby. This “hard edge” approach has done little to foster support for conservation and environmental issues and this legacy can be seen in the lukewarm response that the wildlife industry receives from politicians and other decision makers in many parts of postcolonial Africa (Kock, 2005a). In southern Africa, the adoption of community-based approaches to resource management, such as CAMPFIRE (Communal Areas Management Program For Indigenous Resources) in Zimbabwe, softened the hard edge and allowed communities to benefit from protected areas, be they national parks, game reserves, safari areas, or private conservation initiatives (Child, 1995). Other Community-Based Natural Resource Management (CBNRM) programmes continue to be developed and evaluated

Oxcart, Zambia.



in East and southern Africa (Murphree, 2000; DFID, 2002; Weaver and Skyer, 2005; Murphree, 2005; Lewis, 2005) including the DFID-funded Mpomiba project with 19 villages close to the Ruaha National Park in Tanzania and the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)-funded project with forty villages adjacent to the Selous Game Reserve. In Namibia, the National Community Wildlife Conservancy Programme has led to the registration of significant numbers of community-owned conservancies, many of which have entered into joint ventures with the private sector.

In general, pastoralist communities are likely to perceive the main CBNRM benefits to be the managed and more sustainable cropping of bush meat; increased revenues gained from consumptive tourism (hunting) and nonconsumptive tourism (wildlife viewing), or enterprise and employment opportunities in the tourism sector; as well as access to grazing and water resources for their own animals. Indirect gains come from investments in wildlife-related tourism, which lead to improved infrastructure such as roads, water mains, electricity and communications.

To ensure that these protected areas are able to provide the resource base for these benefits to communities, addressing disease issues should be an integral part of protected area planning and management and should involve veterinary and other health authorities. This is crucial as the impact of emerging and resurging diseases on the health of people, their livestock, and wildlife is likely to constrain the maintenance and development of protected areas and compromise conservation initiatives into the future. The potential for spread of bovine tuberculosis from Kruger National Park to surrounding human communities (Michel, 2005) is a case in point. In the 21st century, management of protected areas needs to go beyond just concern for improved relationships with communities through benefits such as cash returns related to CBNRM. It must consider the health of the overall ecosystem, including people, their livestock, and the flora and fauna that are part of the larger community.

Box 5.2

Transboundary management of natural resources and the importance of a “One Health” approach

The transboundary management of natural resources, particularly of water and wildlife, and the associated development of transfrontier conservation areas (TFCAs) has been a major focus of attention over the last few years in southern Africa. Twenty potential and existing TFCAs have been identified in the Southern African Development Community (SADC) region, involving 12 continental African member states. The TFCAs include many national parks, neighbouring game reserves, hunting areas and conservancies, mostly occurring within a matrix of land under traditional communal tenure. Altogether the proposed TFCAs cover about 120 million hectares.

Transboundary natural resource management and TFCA development have also been closely linked to emerging Spatial Development Initiatives (SDIs) and corridors within southern Africa. A key economic driver linking these conservation and infrastructure development initiatives is wildlife-based tourism that seeks to maximize returns from marginal lands in a sector where southern Africa enjoys a global comparative advantage. However, the management of wildlife and livestock diseases within the envisaged larger transboundary landscapes remains unresolved and an issue of major concern to other economic sectors in the region. The interactions at the interface between animal health, ecosystem services, and human health and well-being are also poorly understood, with the result that policy development is compromised by a lack of appropriate information and understanding of the complex systems and issues involved.

Whatever the potential of wildlife-based tourism to generate wealth in such areas, the current reality is that small-scale agro-pastoralists living in the adjacent communal lands depend greatly on livestock for their livelihoods. The need to balance their livelihoods and environmental security with the development of alternative land uses and opportunities gives rise to a very

Box 5.2 (cont.)

complex set of development issues. A central focus of these issues, and one that provides a unifying theme across sectors and disciplines, is that of animal, human and environmental health – “One Health”. Innovative and integrated approaches to disease and natural resource management based on sound knowledge and understanding are urgently needed. An integrated, interdisciplinary approach offers the most promising route forward in tackling these issues.

With the ongoing philosophical and practical expansion of the transfrontier conservation area concept, the needs of communities living in and near these areas must be addressed, as transfrontier conservation areas have the potential to have both positive as well as negative impacts on sustainable livelihoods. In particular, disease issues are a significant concern when contact between wild animals and domestic stock increases with changes in land-use patterns. Corridors themselves, designed to (re)connect protected areas, can serve not only as biological bridges for wildlife, but also for vectors and their pathogens – so thorough assessments of disease risks should be made *before* areas with potentially different pathogen or parasite loads are joined.

Livestock will remain critically important culturally and economically – and of course as a vital source of sustenance – in much of the region. However, when it comes to animal health programmes and policies in transboundary landscapes, where domestic as well as wild animals have opportunities to cross international borders, making the right decisions becomes even more critical.

There is probably no region on earth where animal health policies have had as tangible an effect upon the biotic landscape as in Africa. In many parts of the world, land-use choices are often driven by government (domestic and/or foreign) incentives or subsidies that can favour unsustainable agricultural practices over more ecologically sound resource management schemes. And the most obvious beneficiaries of more holistic management are small landholders and pastoralists: people who derive much of their subsistence directly from livestock, people who are almost always marginalized in African economies and political systems.

Wildlife and livestock disease issues will likely have a significant impact on the future development of sustainable land uses, transboundary natural resource management, biodiversity conservation, and human livelihoods in the marginal lands of southern Africa. Some 65% of southern Africa is semi-arid to arid where extensive livestock and wildlife production systems are the most suitable and potentially sustainable forms of land use. The need to arrest desertification and enhance the capacity of these marginal areas to generate wealth and sustain improved human livelihoods is of paramount importance to the region. There does not appear to be an existing formal policy on animal health and disease control for the TFCAs being developed, and this must be addressed sooner rather than later.

Source: Adapted from Cumming *et al.*, 2004 and Osofsky *et al.*, 2005.

Protected areas, human livelihoods, and healthy animals: how to improve conservation and development interventions

Disease is becoming increasingly recognised as a threat to wildlife conservation, especially for endangered species (Werikhe *et al.*, 1998). The relative risk is often increased by diseases that can be transmitted between closely related species, such as people and primates or cattle and buffalo. Transmission of such diseases at the interface of protected areas with human settlements can be exacerbated by mixing of people, wildlife, and domestic animals, for example, when wild animals leave the park boundaries, when domestic animals graze illegally within the park (Bengis *et al.*, 2002), and when tourists, researchers, and field staff enter protected areas to view primates (Macfie, 1992; Woodford *et al.*, 2002).

Protected areas and diseases

Disease transmission is of particular concern for local communities around protected areas, which in developing countries tend to be surrounded by some of the poorest of the population (Balmford and Whitten, 2003). Problem animals threaten these people's lives and property (Karanth and Madhusudan, 2002), in some cases reducing the value of land around protected areas. In Uganda, with a gross domestic product (GDP) per capita-purchasing power parity of \$1200 (CIA, 2003), those community and rural settings have very limited basic health care because most people have no transportation and live at least 30km from the nearest health centre (Ministry of Planning and Economic Development, 1997; Homsey, 1999). This marginalized group also has very little access to information on zoonotic disease prevention because very little content has been developed for local education (Grant, 2002). Even when people manage to get to health centres, many centres are not adequately equipped to diagnose and treat diseases. This has resulted in a persistence of preventable diseases such as tuberculosis (TB) and scabies that can be transmitted between people, wildlife, and domestic animals.

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Although there are relatively few documented cases of disease transmission between people and wild primates, the number of cases of suspected disease transmission is growing. A disease for which transmission from primates to people has been proven is Ebola, from a chimpanzee in Cote d'Ivoire (Formenty *et al.*, 1999) and, more recently, in outbreaks involving western lowland gorillas and chimpanzees (Leroy *et al.*, 2004). The origins of HIV in chimpanzees are of course now well-known (Gao *et al.*, 1999).

Chimpanzee.



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Diseases that have reportedly been transmitted between domestic cattle and Cape buffalo (*Syncerus caffer*) in Africa include BTB (Woodford, 1982; De Vos *et al.*, 2001), rinderpest (Plowright, 1968; Kock, 1999), and foot and mouth disease (Dawe *et al.*, 1994; Chilonda *et al.*, 1999; Suttmoller *et al.*, 2000). Examples of disease transmission between species that are only distantly related include mongooses (*Mungos mungo*) in Botswana and suricates (*Suricata suricatta*) in South Africa that have contracted human TB (*Mycobacterium tuberculosis*) from rubbish heaps outside tourist lodges visited by someone with a chronic cough (Alexander *et al.*, 2002). A particularly dramatic example of disease transmission from people to wildlife is the outbreak of scabies – a skin affliction caused by mites – affecting mountain gorillas in southwestern Uganda's Bwindi Impenetrable National Park (BINP) in 1996 (Kalema-Zikusoka *et al.*, 2002). This outbreak is thought to have been associated with scabies in the local human community.

Box 5.3

Case Study – Mountain Gorillas in Bwindi and the Virungas

Mountain gorillas and people are very closely related and are therefore potentially at risk of transmitting pathogens to each other (Ott-Joslin, 1993; Wallis and Rick, 1999). Approximately 300 of the estimated 655 mountain gorillas (*Gorilla gorilla beringei*) live in the 33,100ha of Uganda's Bwindi Impenetrable National Park (BINP). A small forest remnant in Sarambwe, Democratic Republic of Congo (DRC), is contiguous with BINP. The remaining individuals of this highly endangered species are found in Rwanda, DRC and Mgahinga National Park in Uganda (McNeilage *et al.*, 2001). The area surrounding Bwindi and the Virungas has one of the densest human populations in Africa, with an estimated 200–300 people per km² (UWA, 2001). The establishment of BINP in 1991 restricted people's access to the forest to controlled activities such as tourism and research, while allowing multiple-use access for products such as medicinal plants, basket-weaving materials, and honey (UWA, 2001).

Bwindi gorillas have close contact with tourists and researchers (Macfie, 1992) and with local farmers when crop raiding (Madden, 1998) or foraging on community land. In addition to receiving inadequate health services and information, the local communities lack hygienic amenities such as clean water and pit latrines (Ministry of Planning and Economic Development, 1997; Homsey, 1999). These factors have resulted in a large percentage of people suffering from preventable diseases that can spread to gorillas. These include scabies, diarrhoeal diseases, measles, and TB (WHO, 2002). TB is exacerbated by a greater than 35% co-infection with HIV/AIDS (Kibuga, 2001) of which Uganda, Rwanda, and DRC are among the highest prevalence nations in the world (Castro, 1995) and are among the 22 countries contributing to 80% of the global TB burden (WHO, 2002).

Uganda Wildlife Authority (UWA), a national conservation authority, has developed an

ecotourism programme in BINP. Sustainable ecotourism is dependent on maintaining gorilla health, improving the welfare of local communities through tourism, and promoting the national economy. The welfare of local communities in BINP has been improved through tourism revenue (via sharing of funds), development of income-generating activities (selling crafts, food, and lodging), and employment in restaurants and lodging facilities (Kamugisha *et al.*, 1997; Ratter, 1997). The national economy is enhanced by the funds generated by mountain gorilla tourism, which amount to up to 50% of the overall income of the Uganda National Park System in some years (McNeilage *et al.*, 2001). However, successful management of gorilla health is undermined by an unhealthy buffer zone surrounding the gorilla habitat. According to the district medical personnel surrounding BINP, the most commonly treated diseases in people are malaria, respiratory tract infections, diarrhoeal diseases, scabies, ringworm, intestinal parasites, tropical ulcers, and eye infections, including river blindness (Robert Sajjabi and Benon Nkomejo, personal communication, 2001).

The first reported scabies outbreak in mountain gorillas occurred in 1996 in a tourist-habituated group of four gorillas adjacent to the Buhoma tourist site in BINP (Kalema-Zikusoka *et al.*, 2002). The source of the scabies was never determined, although people were suspected for two reasons: scabies is common in the local communities; and the gorillas' severe reaction to the disease indicated a lack of prior exposure to this mite from a closely related host. Four years later, a scabies outbreak occurred in another group of gorillas being habituated for tourism in Nteko parish, also in BINP, resulting in morbidity of some of the group. They, too, recovered with ivermectin treatment (Graczyk *et al.*, 2001). While the ivermectin treatment was successful, interventions addressing the public health situation around BINP were needed to prevent further outbreaks. In early to mid-2000, UWA conducted health education workshops with local communities to improve the situation. Over 1000 people in five of 19 parishes

Box 5.3 (cont.)

surrounding BINP participated in the community outreach, which included eight villages. During these participatory rural appraisal workshops, the team presented lectures in the local language to introduce diseases common in the BINP area that can be transmitted between gorillas and people. Prevention strategies were also discussed.

Protected area managers were initially concerned that the local community would believe the park authorities valued gorillas more than people. However, those communities that had directly benefited from the creation of the national park were actually very receptive to these ideas, and gave more recommendations than those communities that had received fewer benefits from the creation of Bwindi Impenetrable National Park. Recommendations from the communities were divided into three categories: medical, non-medical, and hygiene. Responsibility for implementation of improved practices was shared among government and local communities.

Having a multidisciplinary team of community conservation, wildlife health, human health, and education personnel appears to have been helpful. Additionally, the target communities seem to realize that healthy gorillas can generate income to support villages, which have already become trading centres as a result of ecotourism. Encouragingly, communities that received conservation education appear to have a greater understanding of the need to protect mountain gorillas both for conservation and a sustainable income (Kalema-Zikusoka *et al.*, 2001). By contrast, one community in DRC that had received very little conservation education and virtually no tourism or gorilla research benefits did not trust the participatory rural appraisal team enough to admit that they had seen gorillas.

Silverback Gorilla.



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Health education appears to be a conservation tool that can bring the public health, wildlife conservation, and ecotourism sectors together. Local communities that received mountain gorilla ecotourism benefits recognised that they could protect mountain gorillas from human diseases by doing things like digging better pit latrines and covering rubbish heaps. However, some recommendations were beyond the communities' control, such as improving access to better health services or safer water. The lack of access to clean water not only contributes to a range of gastro-intestinal illnesses but also undermines efforts to control scabies, as the mites survive on dirty clothes that can be handled by curious wild animals, such as mountain gorillas (Fossey, 1983).

Improving conservation and development interventions

An integrated approach to controlling disease transmission between wildlife, people and domestic animals in a given area needs to be developed by a full range of stakeholders. This could start with dialogue among the affected communities and professionals from the wildlife, human health, veterinary, agriculture, education, media, and communication technology sectors, and could lead to sharing of knowledge using print, radio broadcasts, video, CD-ROM, handheld computers, databases, or the internet to play a supportive role in improving education and enhancing access to health information and services (Grant, 2002).

Multidisciplinary teams from these sectors could be established to carry out joint education, health training, and research programmes while helping to maximize the use of limited resources. Close collaboration among governments, non-governmental organizations, the private sector, universities, and schools is needed to develop effective and efficient programmes, focusing specifically on interrelated human and animal diseases such as (for example) TB, scabies, brucellosis, rabies, Ebola, avian influenza, West Nile virus and HIV/AIDS. Local involvement in designing these programmes is crucial for long-term success. These grassroots programmes would benefit from input from all key stakeholders to ensure that the materials developed would be relevant to the local situation and available in local languages. Participatory rural appraisal techniques can also help to promote local community ownership of the recommendations put forward.

Joint training programmes could involve medical and veterinary technicians carrying out laboratory work together; and could help wildlife personnel, veterinarians, medical doctors, and other health workers to carry out integrated education campaigns

on interrelated wildlife conservation and public health issues. In addition to promoting collaboration, local community involvement could be encouraged through “training of trainers” to educate others.

Research on interrelated wildlife conservation and public health issues should be encouraged to increase understanding of these links, and results should be shared with policy makers. Such research could help to identify the most common diseases that pose a threat to public health, wildlife conservation, animal agriculture, and ecotourism in a given area. Other research studies could help to evaluate local community attitudes and behaviour that facilitate disease transmission at the interface. Because public health is dependent on people’s behaviour, evaluation of programmes integrating wildlife conservation and public health should focus on how people’s behaviour is changing (or not) over time. Studies to determine how poor wildlife conservation and public health practices are affecting socio-economic development would be useful. Furthermore, research could explore models for sustainability for integrated conservation and public health programmes.

Kenyan children.



Developing “multiple use” health care and diagnostic services and facilities can potentially be more effective in preventing diseases that spread between people, domestic animals, and wildlife because information can be shared more easily. Sharing facilities and services could also save costs. Many places with wildlife have poorly developed infrastructure and few resources for transporting needed goods to the population. Tour operators and wildlife managers with access to good vehicles could help by transporting free medication, such as TB medication (WHO, 2002), to the people who need it. Such a programme has been carried out via the Healthy Community Initiative of the Kayapo Health Project in Brazil, where researchers bring malaria medication to people residing next to the forest (Margoluis *et al.*, 2001). Joint domestic and wild animal laboratories at the interface of protected areas and human settlements could help to facilitate information sharing and better control of disease outbreaks, as could functional community-based animal health systems made up of trained community members, under the supervision of veterinarians, who can provide services to the animals of fellow community members as well as assist in disease surveillance.

Finally, an integrated approach to wildlife conservation and public health can maximize the limited resources available to control disease transmission between wildlife, people and domestic animals at the interface. Funds from wildlife conservation could be allocated to public health, where it directly affects conservation, such as the case of scabies in the Bwindi mountain gorillas. Similarly, donor funds earmarked for health improvement could be allocated to wildlife conservation where it directly affects public health, such as the situation of people contracting Ebola from eating gorillas or chimpanzees (Leroy *et al.*, 2004). Beyond reducing the risks of disease transmission across the human-wildlife-domestic animal interface, a favourable outcome of improving the health status of local communities living around protected areas and of the domestic animals on which they depend is the potential to cultivate a more positive attitude towards wildlife conservation and public health. Developing new constituencies for conservation, especially local ones, is certainly worthwhile.

Conclusions

Disease is becoming an important issue in conflicts between protected area authorities and adjacent communities. These frequently poor communities increasingly perceive wildlife negatively, especially where they have no stake in the management or use of that wildlife resource. Under these circumstances disease outbreaks can trigger conflict, and historically, politics have dictated that interventions by public health and (agriculturally oriented) state veterinary services take priority: this usually has negative impacts on the wildlife resource. On the other hand, those same poor communities and livestock are seen as a threat to many protected areas as they compete with wildlife for resources and also because of a history of disease introductions. This situation is counterproductive for all concerned and cannot lead to better decisions being made for healthier ecosystems or human environments.

To reduce this conflict, as well as the risks and impacts of disease, in particular at the interface between wildlife and livestock but also at the interface with people, a “One Health” approach is required. Public education, training and awareness-raising regarding human, domestic animal, and wildlife health issues are crucial. In addition, more research on land-use and disease management at the interface is needed, as are new philosophies, attitudes, and approaches to livelihoods and resource use. New practical measures, such as multiple-use diagnostic centres, should be introduced in order to improve both animal and human health. This will be beneficial to community development and biodiversity conservation alike.

By raising the profile of the management, development, and research implications of the impacts of infectious diseases on the ecological and socio-political security of protected areas, especially in (but not by any means limited to) Africa, this chapter has sought to sensitize the reader to the critical importance of these issues. As socio-economic progress demands sustained improvements in health for people, their domestic animals, and the environment, the value of moving towards a “One Health” perspective is hopefully clear.